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## TABLE OF CONTENTS

ABSTRACT	2
INTRODUCTION	3
BODY	3
CONCLUSION	4-5
REFERENCES, BIBLIOGRAPHY, AND PERSONNEL LISTING	6
LIST OF PARTICIPANTS (organizing committee members denoted with *)	7-9
APPENDICES	
I. Edited Proceedings of Conference: "Forum on the Health of Women in the Military"	pp. 1-127
II. Review Papers Commissioned Prior to the Meeting	pp. 1-88
III. After Action Report	
IV. <i>Women's Health Issues</i> , November/December 1996	

## Abstract:

A meeting, the "Forum on the Health of Women in the Military" was held 17-19 June 1996 at The Uniformed Services University of the Health Sciences. Prior to the meeting we commissioned papers to review selected topics to be addressed at the meeting. These reviews were distributed to the participants of the conference before the meeting and served as background materials for discussions at the meeting itself. The purpose of this process was to allow a wider distribution of the available information to those caring for the health of women in the military and to those making policy affecting these women. To that end, the substance of the meeting will be "published" in three separate formats. These are: 1) The proceedings of the meeting, including the commissioned papers and edited transcripts of all the talks, are submitted in this report. 2) The November/December 1996 issue of the Jacobs Institute of Women's Health publication "*Issues in Women's Health*" is devoted entirely to the meeting and includes four of the commissioned papers as well as a summary of the meeting. 3) *Military Medicine*, the official publication of EMCEES, will publish three of the commissioned papers in the coming year.

## INTRODUCTION:

As the number and proportion of women in the active duty and reserve forces of the United States Military grows, issues relating to their health and fitness assume increasing importance. This was acknowledged by the recent congressional appropriations of monies specifically targeted for the "Defense Women' Health Research Program. In turn, the US Army Medical Research and Material Command asked the Institute of Medicine (IOM) for help in prioritizing specific needs for research funding priorities in the area. The resulting publication, The "Recommendations of Research on the Health of Military Women" and its accompanying bibliography, are an encyclopedic and comprehensive database on issues important to the health and function of women in the military. Unfortunately because of its very comprehensive nature, this report is relatively difficult for effective access by care providers, policy makers and military officers who are responsible for the health of military women.

The purpose of this project was to bring together active duty women, physicians caring for them, those involved in policy decisions, and those with data and experience to share, in order to address some of the topics contained in the wealth of relevant data noted above. It was hoped that this meeting of expert and interested participants might result in recommendations for further study as well as for potential modifications in current policy and procedures.

## BODY:

As detailed in our proposal and its Statement of Work, we convened a meeting, "Forum on the Health of Women in the Military", at the Uniformed Services of the Health Sciences, 17-19 June, 1996. The meeting was targeted to the specific audience of health care providers and policy makers in the military and to military and civilian scientists with expertise in the subjects addressed. The meeting was successful and the edited transcript of this meeting is enclosed in Appendix I. Prior to the conference we commissioned the writing of review papers on selected topics of interest. These papers were distributed to participants who pre-registered for the meeting prior to the conference and served as background information for the talks and discussion at the meeting. These papers are included in Appendix II.

The major overall goal of the meeting was to allow wider dissemination of available data important to the health of women in the military. Appropriate to this goal, in addition to this report and its appendices, the proceedings of the meeting are being published in two additional places. The official publication of the Jacobs Institute of Women's Health, "*Women's Health Issues*" devoted their entire November/December 1996 issue to this conference. This issue of the journal included four of the commissioned review papers. These are "Military Women as Wives and Mothers" by Christine Wahl and Virginia F. Randall, MC, USA, "Exercise in the Prevention and Treatment of Chronic Disorders", by Patricia A. Deuster, PhD, MPH, "Chronic Dieting in Active Women: What Are the Health Consequences?" by Melinda Manore, PhD, and "Vaginitis/Cervitis: Diagnosis and Treatment Options in a Limited Resource Environment" by

Daniel V. Landers, MD.

In addition, *Military Medicine*, the official journal of AMSUS has accepted three additional review papers from the conference for publication next year. These include "Patterns and Risk Factors for Exercise-Related Injuries in Women: A Military Perspective" by Patricia A. Deuster, PhD, MPH, Bruce H. Jones, MD, MPH, and Joseph Moore, MD, "Health Effects of Extreme Environments on Military Women" by Ann Norwood, MD, Robert Ursano, MD, and Frances Gabbay, PhD, and "Selected Environmental Chemical, Physical, and Biological Hazards for Women in the Military" by Maura Emerson, MD, MPH.

**CONCLUSIONS:** The meeting was well received by the attendees and a summary of the after action report prepared with the help of the University's group on Continuing Professional Education is enclosed as Appendix III. The major criticism of the project as a whole, concerns our failure to attract as large an audience as we wished. While all attendees were appreciative and enthusiastic, there were relatively small numbers in attendance. This was particularly true for certain groups, such as enlisted active duty women and NCOs involved in training and support of these women. This occurred in spite of our making every effort to publicize the meeting and to attract a wide audience of relevant individuals. None the less, with the consequent publication of the proceedings as listed above, and the enthusiastic response of the attending group, it would appear that a great deal was accomplished.

Recommendations from the attendees are included in great detail in the proceedings of the meeting, but are also summarized below.

**Recommendations:**

On the final day of the conference, participants attended one of five breakout sessions, the goals of which were to discuss the specific topics addressed during the conference. Out of these sessions, several recommendations were made in the areas of education, research, and policy to improve the overall health of women in the military. These recommendations are as follows:

**STRESS AND EXTREME ENVIRONMENTS:**

1. Develop clear definitions of stress in terms of load, circumstance, etc. Study the responses to both general and specific stressors in terms of physiological and psychological variables across genders.
2. Focus research efforts in the area of resilience, or successful performance under stress. Having done that, define risk factors for breakdown and formulate pre-planned interventions for prevention and management of stress-related problems.
3. Form integrative relationships with other groups whose focus is to combat the effects of stress through proper diet, exercise, and other effective coping mechanisms.
4. Examine such stressors as sexual harassment and/or assault and the consequences of these events within the military environment

## REPRODUCTIVE AND PREGNANCY ISSUES:

1. Recruit multi-service, multi-discipline task force to develop a DoD policy for pregnancy.
2. Formulate an algorithm for assessing individual risk both for gynecological and obstetric patients and also for the general population to reduce complications during deployment.
3. Disseminate information regarding pregnancy from health care providers to personnel and across services via the Internet ; share information in terms of research or administrative issues through tri-service databases.

## CONSTRUCTIVE ADVOCACY

1. Involve people at grass roots level in policy making, because written policy mandates are often inconsistent with what is really experienced by the service member.
2. Direct efforts at breastfeeding by presenting goals to the Commander as a readiness issue, i.e., research has shown that breastfeeding women achieve their pre-pregnancy weight faster than non-breastfeeding women, and breastfed children are often healthier, which translates into less work days lost to bringing sick children to the doctor.

## NUTRITION

1. Perform random weights rather than scheduled weights to reduce cyclic dieting
2. Identify healthy heart choices in dining facilities.
3. Implement nutritional education programs more consistently throughout training, to include specific issues important to women in the military, such as iron and calcium

## FITNESS

1. Identify risk factors for injury in pregnant and postpartum women and develop tri-service policies related to fitness and readiness for these women
2. Target clinical research to standardize the criteria for stress fracture and analyze injury patterns across all ages of women and special populations.
3. Define the risk factors for heat injury in female
4. Identify appropriate training techniques to reduce the rate of injuries.
5. Standardize the weight charts across services, and rather than having arbitrary fitness testing, standardize fitness testing related to your work, age, and MOS.
6. Educate about the effect of using alcohol and tobacco on performance and injury rate and health.
7. Look into recommendations for maintaining fitness during deployment and for reservists.
7. Promote alternative forms of aerobic exercise besides running. Make use of outside sources of knowledge to allow up-to-date training for fitness leaders and those in health promotion.

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Recommendations for Research on the Health of Military Women. Committee on Defense Women's Health Research. Institute of Medicine, National Academy Press, Washington, DC, 1995

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- 3) Norwood, Ann, Ursano, Robert, and Gabbay, Frances. "Health Effects of Extreme Environments on Military Women". In Press, 1997 *Military Medicine*
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**APPENDIX I:**

**EDITED PROCEEDINGS TO CONFERENCE:**

**FORUM ON THE HEALTH OF WOMEN**

**IN THE MILITARY**

**Uniformed Services University of the Health Sciences**

**FORUM ON THE HEALTH OF WOMEN**

**IN THE MILITARY**

**(Day 1)**

**June 17, 1996**

## TABLE OF CONTENTS

	<u>Page</u>
Welcome to the Meeting Dr. James A. Zimble	1
"When Johnny Goes Marching Off Again" Dr. Robert Joy	1
The History of Women in the Military Gen. Evelyn Foote	8
<b>Environmental Stressors and Military Women</b>	
Introductions Lt. Col. Ann Norwood	18
Panel Discussion Harry Holloway, Moderator	21
PTSD in Women Veterans Dr. Jessica Wolfe	23
Aviation Capt. Rosemary Mariner	29
Desert Storm Maj. Loree Sutton	36
Vietnam Operation Baby Lift: Lt. Col.	46
Questions and Answers	55
Summary Dr. Robert Ursano	60

DR. ZIMBLE: I can't think of a more important issue. I have never thought that there was a more important issue than women in the military; that gave me job security. But over the course of the years, as we have seen more and more women assume larger and larger roles in the military, and get placed in unusual environments, women who are single parents, women who are wives, men who stay home and women who go out to sea. When we have put women in line jobs that they have never held before, unprecedented, then we have to stop and think, wait a minute, what are the new issues in terms of health, and they are different.

At any rate, I'm not going to take a lot of time. There are some marvelous speakers who are going to talk on various issues. Dr. Warren Pierce is here, who is the executive director of the Jacobs Institute, and they will be publishing the proceedings in some of the forthcoming issues of the journal. We are just delighted that you are here, Warren, and are able to do this for us.

I had spent four years as Surgeon General of the Navy from 1987 to 1991, and was very concerned that more and more, we were looking at issues of first-trimester pregnancies, and were looking at issues that were specifically female issues, psychological issues and physical issues that were unprecedented, and what we were doing about them. Were we changing our IOLs, our initial outfitting lists, to accommodate those things that needed to be accommodated, where we put women in new places.

At any rate, this is the first time I have seen where we have brought people together to get all the issues on the table and start discussing what we know, what we don't know, what research needs to be mandated as we get on with the 21st century, and the 350,000 plus women who are serving on active duty in the military services.

I welcome you all. I hope that you all find this a rewarding experience. You are guests of this university, but you also own the university. You are all taxpayers. We consider it your university, and anything that we can do to support you, don't hesitate to let us know.

RADM ABDELLAH: I am Faye Abdellah, the Dean of the Graduate School of Nursing. I will be moderating the first half of the afternoon. Our second speaker hardly needs an introduction, Colonel Robert Joy, who is retired from the Army. He is a physician, an historian, a distinguished professor, and until recently, chairman of the Section of Medical History at our great university. He will continue as distinguished historian of USUHS.

DR. JOY: My purpose with you this morning is to talk about combat. Some 3200 years ago, an Egyptian papyrus described occupations. Of the soldier, they said, "I will instruct thee concerning the condition of a soldier. He is taken as a child of reed's length. He rises in the morning only to receive castigation, and he will be wounded with bloody wounds. He is accounted with weapons in his hands, and he stands on the battlefield each day, lacerating blows dealt his body and another on his skull. A blow is dealt his eyes and his nose, and he leaves off work beaten like a papyrus and battered

with castigations."

I would not have you confuse combat with simple killing. Some 25,000 years ago, Paleolithic man left a cave painting in a cave in France which strongly suggests the use of force on a human being. In relatively modern times, about 1000 B.C., down at the tip of South America, in Patagonia, somebody put an arrow into someone else.

Killing is not combat; that is just the human condition. War is a social institution. It is one of the two unique to humans, and combat is a part of institutionalizing the killing. Combat requires a state-sanctioned killing, an army -- Egypt had one at least some 3,000 years ago -- and it involves military weapons. Egyptian battle axes, for instance, or a specialized club, the mace, and the spear, the sword and the sling, the early missile weapon, all were developed to improve the capability to damage and kill people in an organized fashion.

This Roman soldier demonstrates another issue in the man-machine interaction, in the weapon-person interaction, because his technology, except for his sword, is borrowed. His mail and his shield come from the Gauls, his spear and his helmet from the Greeks. But that famous Roman gladius, a short sword was the weapon that built and kept an empire for some 500 years, when it connected with a Saxon skull, the outcome was clear.

The bow came early as a weapon in Greece. In Greek, it is called the toxon. Since arrow wounds were usually septic and hence fatal, they were thought to be poisoned, and so our words toxic and toxicology come from the Greek for bow. The longbow of England, coming from that famous Crecy in Argencourt, if you recall your Shakespeare, was replaced in the 10th century by the crossbow, a weapon that anyone could learn to use, and it could punch a bolt right through chain mail.

Mobility became a part of a weapons system, the chariot, the horse, the stirrup coming in about the seventh to eighth century, which permitted the development of the true armored knight, the heavy horseman with the lance and sword and mace, which was then defeated by the 16th, 14th and 15th century by the Swiss pike, 18-foot long pikes, held to the ground, and they would defeat the charge of the armored horseman. No smart horse will run up against a pike. So the defense and offense in combat keep counter-poising each other.

Cavalry remained useful, however, for reconnaissance, for pursuit, and in breaking through weak infantry formations with shock action. Mounted infantry, called dragoons, dismounted to fight in the 18th century, and up through World War I the camel in the desert provided mobility for combatants.

Gunpowder arrived to improve war in the 15th century, both by cannon and by hand-held tubes, which fired one shot and had a tendency to break the shoulder of the person firing it. But notice here that you still had bowmen involved. In other words, there is always a mix of weaponry.

A century later, the matchlock musket came along, quite inefficient, but eventually it became a central part of the line of battle, but note that pikes are still there to ward off cavalry. By the 18th century, the flintlock musket and rifle became the standard

infantry weapon. Tactics in combat are always weapons-dependent, so if you fortify as your defense, you begin to build scaling ladders and so on for the attack.

Facing each other -- this slide shows Crecy in the 14th century, close up in melee with the sword, bow and lance. By the Napoleonic era, the bayoneted musket had replaced the spear, and after two rounds of fire, the event was settled with the bayonet. Functionally, the bayonet also was used as a pike to defend against cavalry, as you see here, in a British square of Waterloo.

Combat at sea had in some ways paralleled that on land. Roman galleys fought each other by ramming, but mostly by boarding for hand-to-hand battle with the weapons of land combat.

But then in the 17th century, the warship became practical as a sailing ship and an armed ship, and it became the most complicated machine of that pre-industrial era. Combat was ship on ship, cannon in broadsides with the weapons. A sailor functionally was a cannoneer, an artilleryman, and ship destruction determined the outcome of combat.

By our own Civil War, ordinance had become sophisticated. The rifle musket could wound and kill at 300 yards. Artillery was widely used. Artillery shells with canister rounds like this one, were giant buckshot, and produced wounds like this, or scooped out corpses like this.

Now, the war at sea in the Civil War introduced the ironclad, the forerunner of the steel navy. This just meant more of the same artillery duel, if you will, the same combat hazards with only a marginal increase in protection.

Well, our Johnnies went to combat after the Civil War to make the West safe for settlers. But there was a civilization out there that thought that it owned the land, and so sometimes Johnny did not come marching home again. Artillery got bigger in the South African War at the turn of the century with longer range and the new explosives. But nothing really changed about combat until June of 1914, when an Austrian archduke and his wife were assassinated at Sarajevo. We always come back to the Balkans.

World War I began two months later. New and better tools were developed in that war to engage in killing people. The flamethrower was introduced by the Germans. It was of limited use. It wasn't particularly reliable. The hand grenade was most useful, particularly as it was perfected in trench warfare. The machine gun, initially only fully exploited by the Germans, later by everyone, was extraordinarily useful for mass wounding and killing, particularly by grazing fire. Coupled with another new weapon of combat, the airplane, the airplane and machine gun ended centuries of cavalry usefulness in combat.

Somewhat crude in its early application as a weapon, airplane development took some working out for a year or two. But then air-to-air combat, strafing, bombing, reconnaissance, all of these became a major part of the fighting. Although it is important to note that 75 percent of pilot deaths were due to accidents in training, accidents in combat, and not at all due to enemy action.



The ironclad had become the all-steel battleship, but its weapons were still the guns, and the sailors served the guns as artillery afloat. But that dominance of the surface was soon threatened by the submarine, again fully exploited by the Germans, particularly against merchant shipping. There were attempts in World War I to use ships as airfields, but that would have to wait a war.

The truly new weapon for combat was the chemical weapon. Chlorine gas was released by the Germans on 22 April in 1915 at Ypres, and the chlorine and later the phosgene damaged the lungs, produced pulmonary edema, cyanosis, but it was not particularly fatal; about two to three percent of gassed soldiers died. Gas masks thus became the order of the day -- uncomfortable, hard to see from, difficult to communicate. One officer wrote, "We gaze at one another like goggled-eyed imbecile frogs. The masks make you feel only half a man. A man doesn't live on what passes through the filter, he merely exists. He gets the mentality of a wide-awake vegetable."

The prime mover in that combat had to be protected, and the orders went to the artillery and quartermaster people, mask your horse first, because you cannot teach the horse to hold his breath.

In 1917, the Germans introduced mustard gas, a blister agent, particularly bad when it soaked the uniform and then essentially burned the skin. Again, not very fatal, but terribly disabling, with long hospitalizations. Thirty percent of American casualties in World War I were gassed casualties. Mustard was a persistent agent. It was not noticeable, and it particularly thus attacked the eyes, and you were temporarily blind.

Siegfried Sassoon, the most famous soldier-poet in the British Army, in one of his cynical comments, "Does it matter losing your sight? There is such splendid work for the blind, and people will always be kind." But 98 percent of the men who had been gassed had no residual eye problems.

The last new weapon of World War I was the tank, introduced by the British, developed enough by 1918 to be somewhat useful in infantry attack, a return to a kind of modified use of heavy cavalry as a shock weapon. But the world said it was swearing off that kind of combat in 1918. Twenty million dead, the bloodbath was too much, said Europe and the U.S.

But of course, there was a man in Berlin who did not agree. Combat returned when Hitler invaded Poland in 1939, and World War II began.

World War II saw the flowering and fine development of those World War I weapons systems, the bomber, the massive air raids on cities, the aircraft carrier, and thus the vulnerability of battleships to air attack, so clearly shown at Pearl Harbor on 7 December, 1941. The tank and armored tactics developed by Rommel in North Africa and by Patton in Europe showed what could be done with armored warfare. And amphibious assault from the sea by the Marines added a new dimension of mobility.

One new terrible weapon, the atomic bomb, surely shortened the war with Japan. But this picture is not Hiroshima and Nagasaki. This is Tokyo. It was destroyed by incendiary bomb raids by the B-29s, with many more killed there than in the two atomic

weapon attacks.

But when you come down to it, the root cause, the war was won by men who live on the ground, men who walk to their war, men like this Marine. The combat artist who sketched him on Guadalcanal said it is exhaustion and it is disease. He hasn't stopped fighting long enough to discover that he has malaria. He is going to discover it now. He is through.

While the carousel is being changed, let me move from the development of weapons for combat and the history of the defenses against them, and explain what combat meant, at least in part, to the individual soldier, sailor, Marine or airman, and what it meant and means to live in a combat zone.

Now, it will not have escaped your attention, ground combat was up close and personal, and in fact still is. Most of the time in combat, however, is not spent fighting. There has never been continuous day-in, day-out steady fighting for weeks. Men, weapons systems, simply cannot support it.

So in many ways, it is the simple routines of daily life and their special case in combat that I will discuss first. Eating, for example. On those wooden warships, men ate in messes with chosen comrades, drop-down tables, which persisted in the all-steel navies of our century. The ship, you see, was the sailor's home. He lived there much as he would ashore. For him, combat occurred rarely, when navies clashed.

This was not true for the soldier. He drew his rations from the commissariat, the quartermaster in all the early armies, but then he retreated to a small group of friends to eat and to boil coffee, sitting on the ground. If conditions permitted, the cooks and mess equipment would arrive and the men would line up and get their rations in a mess kit or a can, and then go to eat together, sitting on the ground.

These pictures, incidentally, are from our Philippine campaign at the turn of the century.

On the Western front in World War I, French mess cooks got forward to make soup, but British soldiers ate from tins of food, sitting of course on the ground. But if their cooks did catch up with them, then they did get hot food, which they then ate standing up.

World War II saw the canned C-ration, but the soldiers shown here have been given hot food in mess kits as they eat on the ground.

Our army, ever vigilant to the latest high technology, serves its hot food on disposable trays. Believe it or not, they are called T-meals. The new dehydrated foil-wrapped field ration is the meal ready-to-eat, MRE. There are all sorts of obscene other types of MRE that I will not go into with you. You add water, you then heat it on the tank engine grill, and then in the desert, particularly if you are a Marine, you will eat it with your KBAR knife.

Now, my point is that soldiers are fed either individual meals or some kind of unit cooked food, and they eat outdoors on the ground in combat. But getting rid of what is not absorbed is a major problem of sanitation and aesthetics.

These scenes are Spanish American War -- about 1899 -- burn-out latrines. You added wood and kerosene, set it on fire to burn the feces.

This is a personal British trench latrine in World War I. It is a field expedient, it is cut from a five-gallon biscuit tin, and straw was to be added, as you see in G, to burn your evacuations, or you could carry it to a hole. But this was a field expedient. A good idea, however, not to lose your balance while you are straddling that.

This World War I pit latrine is a model we still use today. Sometimes we have box seats. In World War I, as punishment for minor infractions, the sergeant would send you to empty the boxes.

This is our Gulf War. That is another burn-out latrine, made from oil drums and burned with diesel fuel to burn them out, and the same sergeant's pets are sent to do the duty.

Sleep is required on ships from sail to steam. The hammock lasted well past World War II. Now, at least in our Navy, the men sleep in bunks. Back on the ground, you catch a catnap near your vehicle or in it, while waiting for orders to move, or most commonly in a hole in the ground, rolled up in a blanket or a sleeping bag.

The sailor faces storm and sea conditions if he is on deck, but the soldier lives on the land, or in it, from Valley Forge in the winter to the retreat from Moscow in the winter, to the Crimean War in the winter, World War I in the winter, World War II in the winter, to Korea in the winter. If it is not snow and cold, it is mud, mud everywhere, in Flanders Fields, in fronts in World War II, and in Germany on the Northern Plain, and particularly in Vietnam. Mud is the common enemy and the common accompaniment of all armies and soldiers and Marines at all times.

Not always is their land flat. They climb mountains in Korea or move across a barren bleak wasteland like the Falklands, and that is where soldiers live. The tropics offer monsoon rains and jungle heat, the desert offers sand and stuck vehicles, and oddly enough, floods in gullies in the desert.

Weather and terrain damage soldiers. Particularly, to choose just one kind of damage, feet, healthy feet, are central to staying alive. Frostbite, cold injury due to lack of foot care cripples a soldier, makes him a patient, and may damage him for life. Foot care is a daily chore for what is aptly called the foot soldiers. There are no laundromats in combat. You will toast your own socks to dry them out. Wading in mud in rice paddies, as in Vietnam, can give you the kind of boot area infection in this picture if foot care is neglected.

If there is one thing soldiers do, and Marines, they walk. In World War I, they walk in the Ardennes, in France in World War II and in Italy in World II, they walk in Korea, they walk in Vietnam, and they walked in the Falklands.

The sailor, you see, has the ship to carry his belongings, the airman lives on the airbase, but the soldier, like the snail, carries what he owns on his back, from Roman times, one of Marius' mules, just before about 100 B.C., to the battlefields of Burma in World War II, and he packs in his fighting requirements of ammunition as well in

Vietnam, and he brings them in on his back. But there may be a truck ride or a Bradley fighting vehicle to cover some distance from startoff point to the fighting area, but the infantry still closes with the enemy on foot.

At that moment, every soldier and Marine faces the questions of life and death, or being wounded or killed, from Wellington's sabred infantrymen at Waterloo to shrapnel in the face in World War I, to being wounded by a mine in Vietnam, or being pulled from a burning armored personnel carrier.

The sailor is not immune. As a carrier goes down in 1945, the survivors are oil-soaked and burned. They are pulled from the sea and taken below for care. Some who are wounded in aerial combat are able to return to their base, but many, many do not come back at all.

But from ancient times, for the soldier there have always been other soldiers assigned to give initial care to their comrades. Evacuation from the field is a priority in the Roman wars, and in Napoleon's army and in our own Civil War. From the muddy fields of the Somme to the jungles of the Philippines and the mountains of Italy in World War II, there has always been a medical soldier in the battle with the fighting soldiers to care for those who are wounded.

But there is another end to combat: death. In some ways, perhaps it may not matter how one is killed; best that it be quick. Walt Whitman wrote of the dead he saw at Gettysburg where he served as a nurse: "In midnight's sleep of many a face of anguish, of the look at first of the mortally wounded, that indescribable look of the dead on their backs with arms extended wide, I dream, I dream, I dream."

The slaughter on the Western front in World War I was so awful that the British officer poet, Wilford Owen, wrote: "What passing bells for those who die as cattle? Only the monstrous anger of the guns." Siegfried Sassoon of the Royal Welsh Fusiliers, equally enraged at the slaughter of the British Army: "The place was rotten with dead. Green clumsy legs and trunks face downward in the sucking mud, bulged clotted heads slept in the plastering slime."

We no longer seem to have such poets. We put our dead in typical American fashion in tidy body bags. In this picture, Sergeant Kosicuetz grieves for his friend in that body bag, and he exemplifies the tragedy of the end of combat for his comrade.

Let us now go to a video. This video is taken from clips filmed by Army combat cameramen in Vietnam. There is no sound, because that was cranked in later. I will simply let you watch it without further comment.

(Whereupon, a videotape was presented.)

DR. JOY: I think perhaps you can see much of what I was speaking about.

This has been one view of combat, a personal one. There are many other visions and views of combat that could be offered. Mine has obviously been heavily weighted to the ground soldier, where the bulk of the casualties and killed are seen.

But I find that I am not alone in that view. Gedov Fehrenbach's view, as you see it written here, is supported by thousands of years of military history. This morning, this

afternoon, in Bosnia, we have sent Johnny and this time Jane marching out again in the mud. Peace making, we call it this time. They have been shot at. Maybe more will be damaged and killed, particularly, as it seems, we are now going to spend more time there. So I know you join with me in wishing that God grant that they come home safely.

RADM ABDELLAH: Thank you, Dr. Joy. There will be an opportunity for questions after our next speaker.

Our next speaker is Brigadier General Evelyn Foote, affectionately known as Pat. Born in Durham, North Carolina, she received her commission in the Army in 1960. She holds a bachelor's degree in sociology from Wake Forrest University, a master of science degree in public administration, as well as an honorary doctor of arts from Wakefield University. She also is a graduate of the executive program at the University of Virginia.

Throughout her career, General Foote has fought to remove barriers to women's utilization which were based solely on gender. It is my privilege to introduce General Foote.

GEN. FOOTE: As a woman who served quite a few years ago and who has been retired now for some seven years, I can't begin to tell you how thrilling it is to me to see that finally, at the Department of Defense level throughout the structure, we do have an initiative under way to look into what are health problems that are peculiar to women per se, because during most of my time on active duty, this certainly did not happen.

When I think of Dr. Joy's presentation, his very, very graphic depiction of the horrors of war, you sometimes wonder why any person, man or woman, would want to take part in a profession that has its people in harm's way in such a degree. But thank heavens, in America and in the democratic nations of the world, and in most nations of the world, there are young men and women who will continue to stand up and answer the call when their nation calls.

Now, there are those who say that women's participation in the military is strictly a 20th century phenomenon. But actually, it began well before that. There is no period of time in American history, from Colonial days to the present, when women in some capacity have not actively participated in the defense of their nation, whether in the frontier years, as those who helped defend the home along with the men, whether as so-called camp followers in the War of the Revolution, when the camp followers actually were the logistic support for the Army in the field, the women who were employed by General Washington to go with the companies and to provide the logistical support to the men or the families of the soldiers, who went to provide this support.

There were women who served in every army in every war, albeit more often than not incognito, wearing the uniform of the soldier, masquerading as men, but also as civilians performing the duties of nurses at the front. So the participation of women in the military is no new thing, although its formalization within the institution is indeed a 20th-century phenomenon.

I am one of those people who can stand up here and say now that I am one of the female Neanderthals within the military. I came into the military in 1960 and into

my service, the United States Army, at a time when entrance into the military as an officer and into a corps was based upon gender. It certainly had nothing to do with qualifications to be a soldier.

I came as an officer into the Women's Army Corps, a corps which no longer exists, and in fact which was dis-established in 1978. But in 1960, I was a young woman seven years out of college, 29 years of age, somewhat disappointed at the ankle-high ceiling of opposition, which kept me from doing anything that I wanted to do in the civilian sector. I was with the FBI for three and a half years, but I couldn't be an agent in the 1950s. I was a reporter on the Washington Daily News, but I didn't want to report foods and fashions. I worked in Blue Cross/Blue Shield, running the enrollment department, but I couldn't be the enrollment manager or a salesman, because that was man's work.

So I did come into the United States Army, frankly out of curiosity, more than anything else. Here was an organization which paid its people miserably, but women were paid as miserably as men, equally. It had nothing to do with their gender as to what they were going to make, and I thought that would be well worth investigating for two years. And two years became more than two, became 10, became 20, became 30, and an improbable career spun its course during three decades of change that have been monumental, that have redefined what the 20th century is, and certainly have had much to do in defining what the 21st century will be in America.

I guess I can say that the career that I have in many ways reflects the quantity of change, not necessarily the quality, but the quantity of change. I started in an all-female corps, the Women's Army Corps, where the command structure, the leadership structure, the instructors, and the recruiters were females recruiting other females, to be trained in time of emergency, to provide the training cadre for more female. It was gender-specific, it was gender-oriented. In that corps in the 1960s, my career was not described so much in terms of its possibilities, but rather, in terms of its limitations, because when I came in in 1960, a woman could be an officer for probably 20 years, mostly as a reserve corps member, rarely as a regular Army member.

A woman, if she were extremely fortunate, might advance to the rank of major. If she were truly lucky, she would be a lieutenant colonel. I think in my corps, we had nine lieutenant colonels when I came on active duty. If she were the director of the corps on a temporary basis, she could even wear the eagles. But those eagles flew right off her shoulder as soon as her tour as director ended, and they went to the woman who succeeded her to be the director. We only had one colonel.

This wasn't by whim, it was by law. By law, women were limited in the numbers who could serve within the military, within the regular force, to no more than two percent of that force.

In 1964, when I went to Fort Belvoir, Virginia to command a company, I commanded an all-female company. No men, because women could not command men. I could supervise men, but I could not have uniform code of military justice or court



martial authority over males. That was men's work.

So believe it or not, there were some constraints out there to work around. As I have said, my career was more in terms of its limits than its possibilities when I initially came on board.

But look when I came in -- 1960. Look at that decade and what it became in American history in terms of social change, of turmoil, of the incredible frenzy created in the country at large, simply by the Vietnam War, a war which the American people did not support, because they were never asked to support it. We did have a guns and butter policy. We had a war that was never declared as a war.

In this tumultuous decade of the 1960s, we saw the fabric of our society literally ripped apart, and was at times in danger of coming totally apart at the seams, because of youth versus authority, war versus antiwar, the rising voice of women, women who no longer wanted to be satisfied with home and hearth and motherhood, although these continue to be in my estimation the most important jobs a woman would ever have. I say that as a woman who has never married and has never had children.

But this was a time of turmoil, a time of social change, of ferment. It was also a time when the rights of the individual, be they black, white, whatever their color, when the rights of the individual, the civil rights, were being looked at and measured and evaluated. We were as a nation realizing that we had a long way to go in insuring that indeed, we were the land of the free and the home of the brave, and that every person had the same opportunity.

So I am talking about a decade when my career went from being very limited initially to there beginning to be some blue spots up there in the cloud line that showed blue heaven, and maybe some changes would be coming.

In 1967, November of 1967, after a great deal of work, President Lyndon Johnson signed into law Public Law 90-130, which has had a very compelling impact on women in the military. With this law, he rescinded the limitation on grades for women in the military, all branches, and he also rescinded the two percent percentages being the limit to which women could participate in the armed forces.

That was the beginning. In other words, theoretically from that day forward, we could have a woman wear stars on her shoulders. She could be flag or general officer rank. It seemed to many of us, who never thought we would see a day when we would see more than two colonels serving in our corps at the same time, that here was the possibility for career opportunities unbounded.

But it didn't change overnight. I think we have to look at the end of the 1960s and the early 1970s as being again truly defining times for the direction that the forces would go in utilizing women in the military.

In 1972, upon completing the Command and General Staff College, I was assigned as the plans and programs officer to the Office of the Director of the Women's Army Corps. I arrived at that office in June of 1972, and found myself the only woman officer in the branch at that time, because the director, Inez Bailey, and the sergeant major

were off in Southeast Asia, visiting our troops in Vietnam. The deputy director, the executive officer and the plans and programs officer I was to replace were in deep, deep meetings with other staff elements in the Pentagon, discussing the proposed expansion of the numbers of the women in the Army.

This proposed increase was something that had been coming for quite some time, with the fact that the war in Vietnam was going to end, and with the end of that war, even before the end of that war, President Nixon had decreed that the draft would end, the onerous, unfair, much-hated draft would end. It became apparent to everyone in the leadership of the Pentagon that the volunteer force which was coming on board after the end of the draft would have to rely quite heavily upon the greatly increased presence of women in the force, because it was felt that many of our young men in society, who richly despised the notion of conscripted service, who had seen what it had done to their father and their brothers, who saw what it did to their friends and family members in Vietnam, were going to run away from volunteer service in droves, and it happened.

But we had no idea of what genie was being let out of that bottle in 1972, when the planning for the increased utilization began. In 1972, women in the Army had one battalion in which enlisted women were trained. We had one detachment for training officers. We had 900 officers and 12,000 enlisted women. All of the training was conducted at the WAC Center at Fort McClellan, Alabama. In order to go from that number to 50,000 in five years, it was readily apparent that we would have to go well outside the female structure to get the cadre members, the drill sergeants, the commanders, the battalions, the training centers, to train the women.

What was happening in the Army was also happening in the Navy, in the Air Force, in smaller measure in the Marines, because the Marines, God bless them, still the smallest except the Coast Guard, have been very candid, very up front and very obstreperous about changing anything about what it is to be a Marine. They have been dragged kicking and screaming in some respects into this new day of greater utilization of women. Isn't it ironic that the first woman announced for three stars was a woman Marine, their only general? But the Navy came right behind. The Navy has a three-star on tap also.

But in those early 1970s, when the social fabric of the military was being ripped apart because women were no longer going to be used to train other women, they were going to be infused into every branch, every corps, every aspect of the military, except that involving direct combat.

It is amazing, what this did to the relationships between Army men and women, because most Army men had never served with women. We were too few, and we were very broadly scattered, and most of our assignments were at headquarters or post level, not out with units and divisions and corps and armies.

So the 1970s were times of tremendous change, which required of the service a review of every regulation, every policy, every procedure, and the purging of those policies and procedures to insure that discrimination for gender alone would not appear in



any regulation.

Sometimes I think we sort of went overboard in purging regulations of descriptors, because whereas most of our manning documents were listed for men and a few jobs for women, suddenly things wholesale were being listed as immaterial whether it be a man or a woman, and we did some pretty dumb things. We put young women who weighed less than 100 pounds into training as ammunition specialists, and their job when they graduated from training would be to haul 155-millimeter shells around, four to a box, and those boxes would probably weigh about 200 pounds. But the women were not trained to lift 200 pounds in training. They lifted empty boxes, to see how you do it. So you get some self-fulfilling prophecies of failure.

Or we put too many women into certain types of units, and did not really seek a proper critical mass or a proper balance. But we were trying everything by trial and error. The 1970s were the time when we did that in all of the services.

The 1970s were also the time when we just turned procedure on its ear. In the Army, where it had been impossible for a woman to be trained as an aviator, aviation training for women became possible in 1973, airborne training for women, about the same time.

Putting women into the military police, which had been a no-no, also started out as a test, but lasted less than six months before all of the military police positions were open to women. Isn't it interesting that the secondary role that women in the military police filled is combat, as infantry soldiers. No soldiers have deployed more in the 1980s and 1990s in the Army than the men and women of the military police. Their deployment seemed to be endless. They are usually the first in and the last out.

So we were changing how we did business in a wholesale fashion very rapidly, with very little preparation of the environment for the enormity of the change that came. We have a way of doing that in the Army. We will always accept a mission and run with it a 100 miles an hour before we really examine the environment, the institution and the components which should have been addressed a year before we got off into this great new adventure.

I like the Air Force way of opening airfields. First of all, they build all the buildings, they build the runways, they bring in all the personnel, they train all the personnel. The last thing they do is bring in the aircraft. Then they make sure they have got the mechanics to repair it. Not us; we open an installation and then we do all of those things, but we are doing our job as we go along.

Somehow or the other, that can-do has gotten us along. We have muddled along quite well. But there are times when people and institutions get hurt by this type of can-do mentality.

I think some of the things that I might highlight as making my career so much different from yours, and why the improbability of my career will not happen to any of you, is that after 18 years of being a member of the Women's Army Corps, with personnel management and command my principal occupation, I became an instant

military police officer, because we disbanded the corps.

We no longer managed women by gender. Since we no longer had a WAC branch, I had to join something, and it certainly was not going to be the Adjutant General Corps, because that is where about 500 women were going to be dumped and therefore, you can bet those women were not going to get very good assignments in the AG's. So I picked the Military Police Corps, Foote the Fuzz, without five minutes of MP training, without any idea of what I would be doing.

Another thing that happened to me that certainly would not happen to a woman today is that the only military police assignment I had was a colonel commanding a brigade, the first woman commanding a brigade in Europe. I had a foreign-deployed brigade, which had a very healthy wartime mission of being the command and control headquarters for all MPS and echelons above the corps. We also had the enemy prisoner of war mission for an entire theater.

So it is really neat to go into a command level as a brigade commander without one minute of experience in that, with the full knowledge that everybody in that brigade knows you don't know what you are doing, because they have already psyched out who you are. But then you've got the challenge of making them realize that you have a right to be there.

So I had a meeting with the officers in the cadre very early. I said, I know that you know that I don't know anything about MPs. But what I know that you don't know is that I know a heck of a lot about commanding, and I know a lot about running organizations, and I know how to run interference. So while I don't have your technical competence, I have all the competence in the world in getting everything you need, supplies, facilities, people to do the job we have to do. So you go do the job, and I'll take care of the other. It worked quite well.

I commanded a battalion at Fort McClellan, Alabama, and had the great pleasure of integrating men into what had been an all-female environment. Now, that is a hoot. Here was a platoon of young men, who had just raised their hand and agreed to serve God and country in the United States Army, who thought they were on their way to Fort Jackson, South Carolina, who at 5:30 in the morning stood in abject terror in the dining facility of my battalion, all female, at Fort McClellan, with female drill sergeants yipping at their front, yipping at their sides and yipping at their heels, teaching them what it is to stand at parade rest, go to the position of attention, parade rest. These guys were just seeing a world of women out there. We thought, good, get a taste of what we have been going through since 1942. Find out what it is for reverse integration.

So the experiences that I have had and the progression of the military are beautifully on track together. We only had two basic training battalions at McClellan when I was there as a battalion commander. The other troops in training were military police troops.

My sister battalion commander and I, also a woman, when we knew we were going to be integrating the battalions and bringing the men in, decided that we would

have to go over to the post exchange and talk to the exchange manager about providing health and welfare items for men.

Now, this post exchange had done nothing but provide for women since 1954. So when we went with our list of niceties and necessities, which included condoms, I thought those sweet old ladies in Alabama were going to riot. I thought we had a dire emergency on our hands. But we did convince them that if we are to provide for the women the goods that they need, then we must do the same thing for the men. And it benefits the women for us to have all of these items here, to include the prophylactics. Of course, that did not go over well with the sweet little old ladies, who could not imagine hanky-panky of any type between the Women's Army Corps members and any young men. But times do change. So we got the items there.

Those battalions no longer train at Fort McClellan. The Chemical Corps and the Military Police Corps are still there. McClellan is scheduled to close by 1999, and then the training for Chemical and MP will probably go out to Fort Leonard Wood.

I guess I tell you all of this, just to let you know that if there is any constant with which we have dealt as women in the military, it is the constant of change. The career that I had over a 30-year period was not the career that I imagined it would be for more than 20 years.

I never expected to command a battalion. We only had one. The director picked the battalion commander. I never expected to make colonel. Good Lord, I never expected to make lieutenant colonel. I would have been happy to retire as a major, on the basis of what I came into the Army with, the opportunity to be a major, and maybe a lieutenant colonel. For the men, that would be like being a brigadier general.

I never expected to be the first woman teaching on the faculty of the Army War College. I never expected to be 55 years old and selected to be a brigadier general. You begin to wonder, did the Army go nuts during that board, that they picked me, 55 years of age? I was trying to retire. I had been trying for six years to retire. But every time I would get ready to retire, the carrot-and-stick game went into effect, and a promotion came or a command assignment came. After brigade command in Germany, which was my happiest two years ever, I thought, that's it, after a year, I am going to retire and go back home and do something else. But I was picked for brigadier general.

So I came back to the United States and was the first woman to be Deputy Inspector General for the Army. But you have got to understand, this isn't because we are so bright. It is because we are the one and only up there. We are one of the few who stayed the course, who went through the change, who survived the RIFs, who survived all of the sea of changes, who survived the end of the Women's Army Corps and stayed with the integrated Army, and decided to make it as far as we could for as long as we could. There weren't too many of us then.

Now I look out at a sea of approximately 195,000 women serving on active duty in all of the armed forces, and easily that number plus others in the reserve components. I look at the flag and general officer ranks of all of the services. I look at the fact that the

Army just picked its second two-star woman, and that is historical. I look at the cult of the possible, which is what we all began to espouse. It is impossible today, it won't be impossible tomorrow. I thought, hang in there, good things are coming, and throughout my career, good things did.

I think I was one of the luckiest generals who ever lived, to have retired from active duty as a commander of a major installation. I commanded Fort Belvoir, Virginia. I was also deputy commanding general of the military district of Washington, which has as its troops the Old Guard, the 3rd Infantry, and all of the ceremonial troops that serve the Tomb of the Unknowns, and participate in everything from Presidential inaugurals to the honors accorded heads of state when they come. Commander of the U.S. Army Band and the Colonial Honor Guard, of the Drum and Fife Corps, interesting units to be commander of.

But the one that I really loved, was that, when my boss, Don Hilbert, who commanded the military district of Washington was away, I became active commander, and I commanded infantry. And women weren't supposed to command infantry, but for an interim period, I had an order that said I was acting commander over the 3rd Infantry. I made sure that the 3rd Infantry knew I was there.

The same thing happened when I was in Europe for one year with the 32nd Army Air Defense Command. That is combat. But whenever the commander left, I was the acting commander, and I would let the command know I am here, and I am in charge.

So many of the constraints that continue to inhibit the utilization of women in the military are those that are in the minds and in the hearts and in the conditioning of those who cannot quite let go of those few remaining positions of the military in which women cannot serve. These are the ones involving direct combat.

The least likely utilization of women in my time and in the next century, I think, will be ground combat. But that is not the issue. There are many operational jobs in the infantry, the armor, artillery, field artillery, where women could perform and perform very admirably. If they get the operational experience, then maybe they will progress to the point within the society where they can truly impact national defense policy.

Women have too little to say about national defense in this nation. The majority population has very little to say about how we conduct our national defense, and who are those at the helm. Women should have a say and should be up there.

I'm not just talking officers, but women who are senior enlisted personnel. Someday, we may have a sergeant major in the Army who is a woman, probably not in my lifetime, but it may come. Someday, we may have a chief of staff or a chief of naval operations, chief of the Air Force, commandant of the Marine Corps, but now, that is the last likely one, the commandant of the Marine Corps, because those guys are going to hang on to what they have got for as long as they can.

Has there been stress along the way? I don't talk about stress. We don't talk about stress. Of course there is stress. Just by raising your hand and agreeing to be a soldier, sailor, airman, Marine, you buy into one of the most stressful occupations in the world.

From the day you sign up to go through a very competitive training, every position for which you compete, every school and every promotion for which you compete is very competitive. Is there stress in trying to marry a career with family? Incredible stress. Is there stress in trying to do everything and be everything that your service says you must be? Is there stress in combatting the prejudice, the opinions of so many that the service of the women is less valuable than the service of the men? You bet there is stress. But there are people out there who want to handle it, too.

Let me tell you about stress. I'm a battalion commander at open ranks inspection of my battalion. We have all the troops standing by their bunks. Everything is out, displayed. I am conducting the colonel's inspection of the integrated company, the first one. I am 48 years old. I stand in front of this fine-looking young man, I am checking out his personal appearance, and I have a hot flash. My glasses steam over. The young man blink2 when he sees my glasses fog. My executive officer whispers, "Ma'am, your glasses are fogged up. He didn't have to tell me that. I knew it. But that was a stressor for the moment, but I have laughed about it a long, long time, because it was just part of my being the battalion commander. I also was menopausal. But it didn't get in the way of my doing my job, I hope.

Let me tell you something else that is stressful, to take a battalion at that age, never having done pushups, situps or the two-mile run, and knowing that you have to be the sterling example, and stand up in front of your troops and do as well as they do, and lead them. So part of that stress was alleviated by my coming in at 4:30 in the morning for two months before I took command, jogging until I could run a mile, jogging until I could run two miles, and pushups and situps. I will forever hate pushups with all of my fiber. I was not built to do pushups. I wish I had done them when I was seven years old. It probably wouldn't have been so bad at 47. But I had to do it because I was battalion commander. You don't wish that off onto somebody else.

I will admit that one of the great days in my life was after I got to the point where I could do this without grimacing. I was jogging with a platoon one morning. I was going backwards with a group of new troops, men and women, and some of the men wanted to fall out, some of the women wanted to fall out, and I was jogging along backward, little old gray-haired lady in a jogging suit, telling them to stay in there, you'll make it. It almost killed those guys. Then I turned around and left them, just left. I said, you have to measure up, and you will.

Yes, there is stress, and there are ways to handle stress. I think humor is one of the best weapons that we have ever used. The stressors that I see are many that affect men as well as women. The stressors that impact women uniquely have been there since day one, whether it is sexual harassment, whether it is a marginalized view of their value, whether it is people who wish to perpetuate the legend that any woman who comes into the military is either a whore or nuts, one or the other, or a lesbian, I should say. And there are still people who use those jokes today. What is the matter, if you don't want to go to bed with me? Are you queer? That has been going on for 50 years. I bet there are

women in this room that have had that type of experience. But these things are still out there, and they are stressors that we all have to deal with as leaders.

But would I change any of my experience? No. I wouldn't change the seven years I had in civilian work, because I think it gave me a perspective to bring into this cockamamie world of the military that helped me all the way. Would I like to have been a little bit younger when I came in? Yes, but you can't have it both ways. Would I want to not have gone through the three decades of turbulence? No, because in many ways, I feel like I am an institutional historical relic. I was there, and I was privileged to be part of the group who helped make the changes, who helped change policies, who helped put ROTC in across the board, who helped bring in career options that weren't there before, who fought the uniform wars, and we are still fighting those. So I wouldn't change it for the world.

But one thing I do know, when I look out now and see the women who are academy graduates, women doctors, physicists, physiologists, psychiatrists, psychologists, ones who are so capable, I breathe a sigh of relief that I don't have to compete with them. I'm glad I don't.

But I will also say this as a retiree. I, along with Captain Mariner, Captain Rosemary Mariner have fought many of the wars for the women, in the corridors of the Pentagon and in the halls of Congress, when it came to the issue of aviation.

I just would continue to be and am a charter member of the National Association of Uppity Women. If we had more military women who would join that association, and speak up and stand up, then I think some of the improprieties and some of the deficiencies in our utilization and assignment and our future would resolve themselves, because we would become personally involved in creating even a better future.

RADM ABDELLAH: We would welcome any questions for General Foote.

PARTICIPANT: What percentage of the several armed forces now are women?

GEN. FOOTE: Well, the numbers serving have actually gone down. I think we find that the percentages are going up. A ball park figure on the active side for the Army, at least, would be 14 to 15 percent.

I read a figure recently of the new trainees coming in, that maybe 20 percent of those coming in are women. So I think we will see that the percentage will continue to go up.

How about the Navy, Captain Mariner, about the same thing?

CAPT. MARINER: About the same.

GEN. FOOTE: Just about.

CAPT. MARINER: If you look at the unrestricted line versus staff.

GEN. FOOTE: Right.

RADM ABDELLAH: Any other questions for General Foote?

GEN. FOOTE: Let me just make one more comment. I meant to mention, and I'm sure a lot of you saw in the Washington Post on Sunday the article about the civilian husband of a Navy petty officer, who went to her home on Andrews Air Force Base,



despite the fact that there was a protective order out to keep him away from her and their two children, killed her and himself. So is there stress in a military career for the woman and man who are married and have children. You bet there is.

RADM ABDELLAH: Thank you. A very special thanks to General Foote and Dr. Joy. It gives us a lot to think about.

LTC. NORWOOD: Good afternoon. In the next ten minutes, I hope to provide you with a quick overview on the topic of environmental stressors in military women. Following my remarks, we will hear from a distinguished panel. First, Dr. Jessica Wolfe will present a scientific perspective on post-traumatic stress disorder in women veterans. Then first-hand experiences with the stressors of military service across a variety of environments will be provided by Captain Rosemary Mariner, a naval aviator, Major Loree Sutton, a physician veteran of the Gulf War, and Lt. Colonel Regina Aune, a Vietnam veteran from the Nurse Corps.

Dr. Harry Holloway will be our moderator this afternoon, and Dr. Bob Ursano will be the close-up hitter, or however that saying goes from baseball, or he will pull it all together for us.

I would briefly comment about three questions which I think might be helpful in organizing what you hear, not only this afternoon, but in the days that follow. These three questions are: what are the stressors in military life, how do stressors affect health, and finally, how might women's responses to stress differ from men's. Again, I think we have had excellent presentations from both Colonel Joy and General Foote, highlighting many of the generic and unique stressors of women in the military.

Like their male counterparts, women in the military are exposed to a wide variety of stressors. There are the routine stressful events in military life: frequent separations and reunions, regular geographic relocations within a wide variety of national and international cultures, the intense demands of a job in which the mission comes first, the stress of belonging to a structural, hierarchical organization for 24 hours a day, from which you can't just up and quit, and the regimentation and conformity associated with military life. I'm sure most of you in the audience could easily expand on this list.

The military also has unique stressors associated with a variety of extreme environments. Perhaps the extreme environment which most naturally comes to mind as universally stressful is war. Again, I think Colonel's Joy's slides very graphically depicted some of the horrors of war to which people are exposed.

Again, thinking about war brings up a host of traumatic stressors: the threat of death to oneself and one's friends, the threat of physical injury and disfigurement, exposure to the dead and the grotesque, and the concerns associated with wounding and killing others. Even in peacetime, however, the military is a dangerous place to work. Aviators die in plane crashes, vehicles overturn, tanks fire upon other tanks, hopefully rarely, ships catch fire, and parachutes fail to open. The list goes on.

Environmental stressors such as harsh climates also exact a toll. Military members serve in geographical locations ranging from the deserts of Africa to the ice

caps of Antarctica.

Well, how do stressors affect health? A schematic by Ursano and colleagues provides a helpful overview of a very complicated subject. It depicts a person's response to a traumatic event. While this particular model is directed towards traumatic events, it is also useful, I find, to use them thinking about less catastrophic events, such as daily work stressors or even hassles of daily life.

In this model, one examines the nature of the traumatic event, as well as its duration and severity. For example, a disaster such as the Midwest floods, which is predictable, has warning, and causes mostly property damage tends to present a different set of stressors from a tornado which strikes suddenly, without warning and can result in a large loss of life as well as property.

The general rule of thumb here is that there is a dose response relationship between the magnitude of the traumatic stressor and the individual's response. That is, the more horrible the event, the more likely the individual is to have psychological sequelae. Again, this is a commonsense observation, I think.

In addition to the stressor itself, stress mediators play a major role in determining an individual's response. As you will note, there are a number of important factors to consider in predicting how a particular individual responds to a particular stressor. There are a number of mediators of special concern in the military, especially because we have the power to influence some of them.

One very important stress mediator in the military is our work environment, often at the unit level. In the Army and particularly in the Marines, unit cohesion has been shown to be a very strong protective factor in diminishing psychiatric morbidity in the aftermath of catastrophic stressors. A strong sense of group identity contributes both to enhanced performance of the group, and to add a resilience to its members.

Women have been noted in particular to use larger numbers of social supports more frequently than men. This then might be one avenue in which women respond differentially to stressors. Similarly, the provision of medical care, financial and other supports for service members and their families can provide important buffers and increase coping mechanisms. Therefore, social supports is a stress mediator warranting study in the military.

Gender differences in anatomy and physiology are also important in considering and understanding military women and stress. Little is known about the gender differences in the metabolism and side effects of many drugs, including those which are used for prophylaxis for nerve and biological weapons. Gender differences in weight, body composition and fat, cerebral blood flow, gastric emptying times, dietary practices and the use of hormones all affect drug metabolism and need further study.

Applied technology to make the field environment more comfortable and safe for women is also important. For example, water discipline can be more difficult to achieve in women working in desert climates, or when wearing protective clothing, because of difficulty in finding suitable places and methods of urination, although I thought some of



the models we were shown this afternoon held a great deal of promise, especially those metal burners. The development of improved technology, it might be argued, would encourage better compliance with water discipline. Finally, there are acute and long-term responses to traumatic stressors which can affect health in the psychiatric, psychosocial and biological spheres.

There are two major ways in which stressors affect health: through stress-related physiological responses, often referred to as fight or flight, and also through maladaptive health behaviors.

Currently there are four major domains which are being studied relating to psychophysiology and its relation to medical conditions. These include the areas of neurophysiology, endocrinology, immunology and cardiology. Some of the areas explored under these disciplines include the role of psychological factors in cancer onset and progression, and the role of psychological factors in cardiac morbidity such as hypertension and arrhythmias.

Maladaptive health behaviors are of particular concern for the military, because they can be more easily targeted for change and are consistent with our focus on primary prevention of disease. Maladaptive behaviors of concern include tobacco use, the use of alcohol, taking drugs, risky sexual behaviors, over or under eating, and so forth.

I should note here that studies of military women in particular have found that overeating seems to be associated with external stressors, while smoking does not.

In a combat setting, maladaptive behaviors could also include not wearing one's protective chemical suits and masks, failing to comply with malarial prophylaxis, taking in inadequate amounts of water. Again, as I think Dr. Joy's slides showed very elegantly, conditions such as trench foot or frostbite are things that soldiers have to work very hard to avoid. So again, if people are not motivated to maintain their health, there can be some very severe consequences.

A number of hypotheses have been put forth on why women's health responses to stress may differ from men's. Something which warrants further study is the observation that women may actually experience more and/or different stressors.

Sexual assault is an example that comes to mind. Rape survivors represent a population of traumatized individuals who experience some of the highest rates of post-traumatic stress disorders. Since women are more likely to be sexually assaulted than men are, this might be an important consideration when interpreting PTSD rates.

Appraisal is another mechanism which may explain differential responses to stress. As Bauman and Gruenebruck summarize, "It is clear that women and men view some aspects of their world in different ways, and that differences in how they interpret what happens to them could be important in determining how much stress is experienced."

The last area, physiological differences, especially of the central and peripheral nervous systems, are certainly possible contributors to gender differences. Clearly, in medicine there are gender differences in rates of illness in many areas of medicine, such

as a higher incidence of autoimmune diseases in women.

I would like to close by using depression to demonstrate some of the issues inherent in studying the relationship between military women and health. Depression I think is a good example. It is a disease in psychiatry where we find that the risk for women is about double that of men. The lifetime risk for major depression in community studies has ranged from 10 to 25 percent in women and five to 12 percent for men.

There are a number of factors which might artifactually explain this disparity. For example, women tend to admit symptoms of all types more than men. This may be true of mood as well. Also, women seek help more often than men. Diagnostic criteria may be biased by sex. Also, women may recall depressive symptoms more readily than men. Also, men might express depressive symptoms in a different fashion or rather, the disease of depression typically cited in this vein is abuse of alcohol or antisocial -- read criminal - acts.

On the other hand, these differences in depression may be real. Biological explanations would include differences in genetic transmission, or that female endocrine physiology predisposes women to depression. Certainly estrogen has been implicated in that.

Sociocultural explanations for gender differences in depression include women being exposed to more stressful events or as I noted, weighing events as being more stressful, also, women having had a disadvantaged social status in many cultures, and finally, women being more vulnerable to the effects of poor social support.

As you listen to the remainder of the presentations, I invite you to experience the stimuli to which you are exposed as challenges which inspire you to leave here curious and eager to undertake future efforts to better understand the interaction between the stress of extreme environments and the health of military women.

Now I have the pleasure of introducing one of my mentors. As someone observed, Dr. Harry Holloway today is here as a moderator. It is one of the first times that the words moderate and Holloway are ever juxtaposed. For those of you who don't know Dr. Holloway, you will see that demonstrated this afternoon.

Dr. Holloway is a retired Army colonel who had a very distinguished career in Army psychiatry. He holds numerous positions and degrees. I'll mention but a few. He holds an honorary doctorate of military medicine from USUHS. He recently finished a three-year stint as Associate Administrator for Life and Micro-Gravity Sciences and Applications at NASA. We are lucky and very happy to have him back in our department of psychiatry here at USUHS.

Without further ado, Dr. Holloway.

DR. HOLLOWAY: I want to begin by saying that it is a great privilege to be a moderator to this very, very distinguished panel. So I want to take very minimal time in my own introductory words to an approach to this problem.

I do want to say a few things to support Ann's interpretation that it is perhaps incorrect to put moderator next to my name. One of them is the following. In discussing

this issue, I hope that we all are very aware that in taking a very responsible and careful attitude towards this matter, that we may be giving ourselves over to the hands of the enemy. Each attempt we make to identify and isolate a particular characteristic of women that demonstrates their vulnerability becomes a weapon in the overall stigmatization of women within the overall process of assigning roles and tasks.

This is a very serious challenge that I think we need to talk about, because I think the social structure that is related to that is both serious and deadly. I believe that it played a small role, but an important role, in the death of a recent chief of naval operations. I believe that Admiral Boorda was in fact the object of a number of people who were doing press releases and other things, partly in response to the fact that there was a person stepping forward in the Navy heavily in support of a future for a number of different groups that weren't traditionally placed in the Navy and weren't traditionally attended to in the Navy.

Nor is this specifically a Navy problem. As you will notice, an ex-Army colonel who works for Newsweek, who himself in his own letters, in his past displays of his commitment to his military career, described his seduction of his fellow officers' wives on his return from Vietnam. You will recognize this as the notable military correspondent from Newsweek. He was one of the people involved precisely in this attack. So number one, the boundaries are not held in or contained simply within the Navy.

Nonetheless, in simply taking note of this, I would take note of a recent interview that occurred on public television with ex-Secretary of the Navy Lehman, in which he described the events in California that occurred at the gathering of the Tailhook Society as unimportant, including his own behavior, in that circumstance. This was public information, presented on television, in which he said, his doing this in the presence of his chain of command was not important.

Bad news, folks, bad news. It is precisely the kind of news that we need to be thoughtful about as we are hearing these very thoughtful presentations, looking at one of our great resources in this country, and a resource that we must learn how to utilize, and utilize to the maximum if we are to remain a great power. There are still bad folks in the world, folks; that is also true.

As the General pointed out in her lecture before this started, we live partly only because brave young men and women are willing to put themselves in harm's way and to be injured. But they do so in this very risky social environment that we are all a part of.

Having said that, and retaining some remarks later, I simply want to point out that this from here on --and I think probably all of this conference -- is a high-wire act, and forget the net. Having said that, it is my pleasure to introduce as our first expert, Dr. Jessica Wolfe, an outstanding researcher who took her Ph.D. at Columbia and is certainly today internationally known and certainly one of our two or three top-flight researchers in post-traumatic stress disorder in this country. She has done extensive studies on veterans of a great variety of wars now, and from various sources. She is going to share with us her perspectives and observations on PTSD in women. Dr. Wolfe.

DR. WOLFE: The topic that I am going to be addressing is very risky, in large part because I am going to take a very dramatic end of the spectrum, and show some of the prevalence rates and effects of extreme violence in our country. In fact, the prime victims of most interpersonal violence by people known to them are women. The common myth is that with increasing violence in this country, that women are very subject to rape by strangers, but in fact, the Department of Justice shows that only 15 percent of rapes are actually stranger rapes. The rest, the 85 percent remaining, are committed by people known to us. So I will be talking today specifically about stress on the catastrophic end, which is traumatic stress, and what we know about violence against women.

I think the problem is a societal one, and I think the problem is basically a prevention-oriented one that must be addressed on a public health level. This is not a psychiatric or mental health problem for women. Unfortunately, that is the level at which we are sometimes reduced to dealing with it. But I wholeheartedly concur that should not be used for personnel or policy implications, but rather for our own information.

Very recently, Kessler published the national comorbidity study in the Archives of General Psychiatry. It is now in 1995 the most recent update on rates of post-traumatic stress disorder in men and women in the United States. They are general community samples that include military populations. In a cohort of 5800 people, age range 15 to 54, they found that post-traumatic stress reactions are far more prevalent in U.S. society than were previously anticipated. In fact, the estimated lifetime rates are about 7.8 percent, whereas previous estimates had suggested they were as low as one to two percent. Just to put that in some perspective, rates of schizophrenia in this country, which is a very chronic and debilitating psychiatric illness, are one percent. So we are talking about a fairly common problem. Kessler also found that out of that 7.8 percent lifetime prevalence rate for post-traumatic stress, men had half as much PTSD as women. They had five percent, whereas 10.4 percent of women had PTSD at some point in their life, which is similar to what Dr. Norwood was saying about rates for major depression as well.

There is some debate in this study as to why that might be the case. Dr. Norwood alluded to the fact that women are exposed frequently to different types of events than are men, and in fact, that is probably a very real underlying factor for why women get higher levels of post-traumatic stress symptomatology. So in conclusion from the national comorbidity study, post-traumatic stress is twice as prevalent in women as men. Women who are exposed to severe or catastrophic stressors were significantly more likely than men to get PTSD.

This study preliminarily suggests that women have some kind of greater vulnerability to getting PTSD. It is not necessarily biological. In fact, as Dr. Norwood suggested, it could be social, that we put them at greater risk for certain interpersonal events. That finding is at odds with other studies that in fact show comparable rates of post-traumatic stress between men and women when they are each exposed to the same

trauma, for example, a natural disaster.

Now, the most prevalent traumatic stressor encountered by women in this country and possibly the world, although I don't believe there is empirical data on it, is sexual assault. During 1992 in this country alone, 680,000 women were raped, and an additional 1.7 million women were non-sexually assaulted. If you do a longitudinal perspective, that comes out to, 12 million U.S. women have been raped at least once in their lifetimes. Furthermore, the most common aftermath of the sexual assault in women, although in men too, although it is far less frequent, is the development of post-traumatic stress disorder.

At two weeks post-sexual assault, 90 percent of female rape survivors will meet criteria for PTSD, although technically, you have to have had the symptoms for four weeks to make the diagnosis. But nonetheless, that is an extraordinarily high rate compared to almost half as much PTSD in individuals who are not sexually assaulted. After three months 90 percent drops down to about 50 to 60 percent, so there is a pretty good recovery. But there is also a similar recovery after non-sexual assault, and the rates of post-traumatic stress after rape remain exceedingly high. In the course of a lifetime, a sexual assault victim has the likelihood of developing PTSD at a rate of about 31 percent. So about one in three female survivors of rape will develop post-traumatic stress from the event at some point in their lifetime.

Now, what about sexual harassment and sexual assault in the military? As General Foote mentioned, these things are not new. The first data on rates of actual post-traumatic stress in women in military service are really from the Vietnam War, and come from data from the national Vietnam veterans re-adjustment study published in 1988. They did not ask about experiences of sexual harassment or assault during military service or Vietnam deployment, but did focus on either personal lifetime threat from rocket or mortar attack, extensive viewing of death and dying or gross dismemberment, et cetera. Women in fact had appreciable rates of post-traumatic stress related to their wartime service 20 years after the war's end. In 1988, about eight and a half percent of women who served in the Vietnam theater still had post-traumatic stress, and an additional 7.8 percent had partial symptoms of the disorder. That is about half as much as male combat theater veterans from Vietnam, where current PTSD rates from the war were about 15.2 percent for full diagnosis and about another 11 percent having some symptoms.

We in 1991 had the opportunity to begin following a cohort of Persian Gulf War veterans. We are now in our fifth year of following up a sample of almost 3,000 Army personnel, comprised of active, reserve and guard units who were deployed to the Persian Gulf in January through April of 1991 from Fort Devens, Massachusetts.

Our original intention was to when they immediately came back from the Gulf about their general psychological adjustment, and to go forward with them prospectively, learning how men and women readjusted following the rapid deployment.

About one-and-a-half to two years later we had about 78 percent of the sample

still responding to our survey. Naively, we did not think immediately at the time to ask about questions related to interpersonal violence but concentrated on more traditional, quote-unquote, war zone stresses. So in our naivete, what we found is what might be expected, although different from the NVRS Vietnam data. We found that within five days of coming back to this country women had significantly higher rates of post-traumatic stress symptoms than did men in our cohort, and furthermore, that this difference persisted out at two years when we saw them again.

I had grave concerns about presenting data like this, because it was right around the time that the whole issue of women in the combat zone, and women in various MOS's was being debated. I was really not interested in providing data to suggest that women in some cases were a psychiatric liability, particularly when we knew nothing about why this might be so.

We looked at what predicted PTSD at time one. Well, it did look like female gender was a risk factor, but why? We looked at PTSD at time two, two years after the Gulf War return, controlling for symptom levels at time one. What predicted PTSD? Low levels of family cohesion, few social supports, a lot of stressors or traumas occurring after coming back from the Gulf, all appear to contribute to getting post-traumatic stress two years after the Gulf War. But gender didn't. So what happened?

It seemed to relate to something that happened earlier that we hadn't been paying any attention to. So we went back and we started thinking about some of our work with veterans of the Vietnam era. Obviously women, like men, are exposed to varying levels and varying types of war zone stress, just as they are during regular military activity.

However, given all the data on sexual violence in this country, why had we not been thinking about rates of sexual victimization during military service? We looked at some data we had from Vietnam, and in fact, we found out when we re-analyzed things that exposure to more traditional forms of war trauma and sexual victimization during military service in women both contributed to getting post-traumatic stress symptoms in female Vietnam veterans. Further, incidence of sexual assault and violence appeared to span theater and area samples, suggesting that this is not simply a wartime problem, but a problem in the military and in the general U.S. society at large. Third, our sample had moderately high rates of childhood abuse, and this abuse itself was in some cases a distinct additional risk factor for post-traumatic stress following adult military sexual trauma.

This is not a unique issue for the military. This is an issue that has now been verified in a number of studies in the U.S. society in general. A study by Martindale conducted by the DoD found about a five percent rate of actual or attempted rape, much higher rates of physical harassment, interestingly enough. A past year prevalence rate for the U.S. would be 2.3, so it says right here that already, military samples may have slightly higher rates of sexual victimization.

We really needed ask some more questions of our Persian Gulf veterans about sexual harassment and assault experiences. The vast majority of women reported no such



event during their deployment, another 33 percent said they had some form of very explicit verbal harassment. A fifth of our sample had some discrete experience, one or more, of physical harassment during their deployment, and eight percent of our sample had attempted or completed sexual assault, that is, rape, during their Gulf deployment.

Now, that doesn't seem so much higher than the Martindale data or the U.S. data, except for one thing, which is that our Army sample was only in the Gulf for an average of 3.1 months. The other proportions that I showed you are past-year prevalence, so they are year-long rates. So in fact, this is significantly higher.

The Mississippi scale is a measure of PTSD symptoms anchored to the Diagnostic and Statistical Manual criteria for PTSD. As might be expected, as you go up the sexual harassment and sexual assault scale towards higher levels of severity of interpersonal violence, you get, not surprisingly, more symptoms of post-traumatic stress, with the most significant and highest levels coming in women who have actual assault.

If you look at the combat exposure that these women had during the Gulf War, whatever kind of combat exposures they had, or other stressor exposure, it did not distinguish women with different types of sexual harassment, sexual assault, or no such incident. So in other words, the women who were assaulted did not report inordinately higher levels of other problems. They weren't bad apples. If you control for their combat stress, sexual assault during the Gulf predicted their PTSD symptoms over and above everything else, confirming what we already know, that this is not a good thing to have happen. Furthermore, they had other symptoms as well, such as depression and anxiety. Most interestingly to me in a way was that physical harassment, not rape, but actual physical harassment itself generated psychiatric symptoms in some of the women, not at the level of a rape, but more than say, for example, verbal harassment or having no such event.

So the spectrum of events that we are talking about involving women are really not dissimilar in some ways to what go on in the corporate setting in the U.S., in workplace phenomena, and range from more minor annoying verbal harassment, all the way up through the spectrum, and possibly are more insidious because of their chronic nature.

There are some distinctive aspects not only of rape, but of severe forms of sexual harassment in military settings that may distinguish them a little bit from single incidents, or incidents outside of military settings, in that they occur in a seemingly safe environment. It is a combined workplace and lifestyle environment, where people spend many, many hours. The perpetrator is very likely to be familiar, and is often or may be in a supervisory role. The event is likely to be highly role discrepant. Women in the military have a soldier image. There may be larger social or vocational implications, actual or perceived by the survivor, if she or he is to report. The survivor's general status remains at the discretion of the institution, which is not necessarily what would happen if it was adjudicated in a U.S. court of law, although that is an issue in workplace harassment and assault. Lastly, the military setting itself by the nature of the possibility

of frequent stressors or re-deployment always raises the issue of possible re-traumatization or additional daily hassles or recurrent stresses through subsequent activities.

But even if bad things happen, better things can be done. The women and men who suffer sexual assault and go on to develop chronic post-traumatic stress, if they receive appropriate treatment within the first one to four weeks after the event, often have a very good chance of making an excellent recovery. Trauma symptoms do not go away by submerging them. They usually come back in a worse form. Active reprocessing is usually required to get over a distressing event. In the first four weeks most normal people get in response to a very bad event is an acute stress disorder. That is something that they can often make a very good recovery from, if they are given the appropriate treatment, unit support and leadership support at the time. Some of the things that occur are very similar to the symptoms of PTSD. There is often some active element of dissociation or feeling like it is unreal, that the event is unreal or is happening outside oneself. That is now seen in some ways to be part of the normal recovery process, if it is handled and not left to continue on.

What are some future research suggestions? We can look for people who are at risk for these kinds of acute stress reactions or chronic stress reactions after being exposed to traumatic events. We can look for developmental evaluations of specific childhood experiences that promote the tendency to lose it, or develop an at-risk profile. Last, we can learn to identify mechanisms of dissociation for people who are not able to engage in a therapeutic process.

I think where we are really going is looking at quick, rapid interventions with a very strong support network and support, as Dr. Holloway said, from the top, where unit and leadership cohesion is seen as not tolerating this kind of behavior, and the survivor is not re-traumatized. I want to give credence to the fact that these events can happen to men as well as women, and they have prolonged effects on them as well.

So to conclude, traumatic stress exposure can have a pronounced effect on mental and physical health status. I didn't talk about physical health today, but Ann mentioned some of it in her talk. Differing forms of trauma appear to account for discrepancies in the rates of traumatic stress that we are seeing in women, with sexual assault contributing the most, and in military women, the rates may be higher for the exposure than for civilian women. Other things in addition for women appear to add to the traumatic stress, such as witnessing severe injury. However, the sexual assault incident itself appears to dramatically increase the symptom levels.

Finally, there is some data that suggests that pre-military or childhood events increase the likelihood of adult trauma in the military and in civilian settings, and poorer outcomes following exposure. However, this is not particular to the military. This is something that we see in all kinds of individuals, and it suggests that if you put people under enough stress over enough time, you will have problematic outcomes.

This relationship has been shown for men, but it is most pronounced for women.



I think it is possible that it is more pronounced for women because we have higher rates of childhood sexual abuse in this country for women than for men. I think we need more prospective longitudinal research to explicate the effects of antecedent events and how they interact with outcomes in men and women, and to find out what we can really do in the active duty setting, even for individuals who may be survivors of these histories, to facilitate their outcome in very positive ways.

DR. HOLLOWAY: Questions that have to do with the substance of the presentation? Perhaps discussion of the data we can hold until we see some more of the total presentation. Are there some questions about materials presented, or some clarifying questions that are needed at this time?

PARTICIPANT: I wondered, when you went back and re-asked or re-polled the women about the sexual assault and sexual questions, was that like 20 months later?

DR. WOLFE: It was at time two, just a week or so after we had done the time two survey. It was right at the same time when we did the follow-up.

PARTICIPANT: I don't know anything about cycles, but my understanding is that people have a tendency to forget things they don't want to remember. Your research data shows that there was still a fair incidence of sexual harassment and rape. Could the percentages have been higher because people didn't want to remember it?

DR. WOLFE: Yes, I think we always get into that problem. In fact, there is a lot of argument in the mental health literature now about false memories. We were asking about very specific, explicit events during a very narrow time period, not lifetime. Yes, it could go either way. Self report retrospective, going backwards, data are always a little suspect. People can suppress their responses. You also run the other risk, which is that they can embellish their responses a little.

So that is an excellent point. I would take everything with a conservative grain of salt.

DR. WOLFE: Again, I didn't go over the main criteria. There are some very explicit criteria. But until about a year ago, you did not have to have functional disability. So in other words, you simply had to meet certain psychiatric symptom criteria.

Ironically, people could be highly functional at work, at home, whatever. In fact, many people are workaholics to compensate for that. The newer diagnoses are looking more to measure functional disability and impaired quality of life. In fact, in some ways that is a better thing for us to be working with, because we are really looking to help people return to their quality of life, and we should probably be less concerned with symptoms in isolation.

DR. HOLLOWAY: Are there any other questions? If not, it is my particular pleasure to introduce our next speaker. She is a professor of military studies at the National War College. She is the first naval officer to have filled this position. During Desert Storm, she commanded the Tactical Electronics Squadron 34, VAQ 34, which operated the A7 and A3 aircraft that flew. Of course, this is a group of about 300 officers

and enlisted personnel.

She has done a whole array of things for a naval officer and flyer. She has logged over 3500 hours of flight in 15 different naval aircraft, and has 17 carrier landings to her credit. I have always wondered whether that is a sign of good judgment or bad. That is just a soldier's view of this sort of thing. She has been the designated surface warfare officer, a strike leader, and she has got the perfect name, the perfect name for this lecture.

Before I give that name, I ought to note that she also has done one other thing, which may be as difficult as landing on a carrier. She is also married to a naval aviator. She is Captain Rosemary Brandt Mariner.

CAPT. MARINER: I always have to point out that some people marry men for their money, and I married my husband for his name.

Last night, after I put my 18-month-old daughter to bed and was trying to pick up around the house, I was thinking about how I would address you all today, and put this in context, stress and military aviation. On the television came a TV show entitled Storybook Weddings. It featured a wedding-to-be at the United States Naval Academy between a submarine officer, male, who was already in the fleet, lieutenant jg, and the young woman was about to graduate and go off to flight training. It dawned on me as I watched this that this young lady was born the year I got my wings. That is shock.

But it is also a good way to address some of the issues of perspective about women in military aviation under this general topic of stress, to show you where we came from, where we are, and how we managed to make it to this point.

In those days, in 1974, as General Foote pointed out, we were in the beginning of the all-volunteer force. It was a time of big change. It was also a time of major draw-downs. Things were very hectic. In those days in the Navy, there were a total of 700 women officers, 60 lieutenant commanders, only one captain, the rank I hold now, and she was the head WAVE, as we called it. Women only commanded women.

There were about 7,000 enlisted women. Of course, these were people that were in traditional areas. I am not talking about the Nurse Corps or the Medical Corps. I have to point out in the introduction, my mother is a retired nurse anesthetist who served in World War II in the Nurse Corps. Believe me, I was raised on stories about military women, about medicine, about the POWs during the war. So that group is kind of invisible sometimes when we go through this history.

At that point, there were certain things that struck you. For example, if you were to get pregnant, you were automatically discharged, no ifs, ands or buts. The vast majority of women that we encountered were not married, because it was almost impossible to keep the two together. Sexual harassment was a term that wasn't in our vocabulary in those days, but boy, was it ever present. Politically correct meant being against women doing anything non-traditional.

But of course, none of this mattered when you are 22 years old and starting out in this big adventure. Believe me, there is a lot of truth in the saying that innocence and ignorance are bliss. You don't need to know that stuff.

What has changed in these some 22 years since that young lady was born? Well, first and foremost in the last two years was the removal of the legal combat restrictions. You have to put into perspective that up until 1991 in the case of women aviators, and 1993 in the case of other Navy women, we were legally discriminated against. We lived in what I called the Jane Crow world. There weren't glass ceilings, there were armor-plated ceilings. Everything that you did was in terms of gender. You could not escape it, no matter what other wonderful things you thought you were doing at the time.

Today, we have 20 years' worth of experience of young women and men attending the United States Naval Academy and other military academies together. The ships were opened after the law was repealed in 1993, but women had been on other Navy ships for some 20 years, including as helicopter pilots. In fact, today the only thing in the Navy that is restricted are submarines, and that is by policy, and the SEALs, and that is by DoD policy.

Since I have been in joint billets for four and a half years now, I will also talk a little bit about the other services. As General Foote mentioned, the Army opened up aviation to women in 1973, about six months after the Navy, and there are probably more women Army pilots, particularly helicopter pilots, than there are in any of the other services. In the Air Force, we have more total aviators but less women right now, but they are also flying virtually every aircraft in their inventory except for special operations aircraft.

The United States Marine Corps had their first woman pilot two years ago, but they have others in training right now. In fact, there are more women training to become Marine Corps pilots right now than there are Air Force women training to become tactical jet pilots.

Unlike 1974, marriage and children are the norm. I think most of our middle-aged aviators anyway are married and have children. All in all, we have gone through a period of revolutionary change that occurred in an evolutionary fashion.

There were two big events that made all this possible, in my estimation. Number one was the Supreme Court ruling in 1976 that allowed military women to remain on active duty when they became pregnant. The second event was the Gulf War, because it showed to the American people what the military had known for a long time, that women were an integral part of the armed forces. All this against the backdrop of the all-volunteer force, in which women replaced men that chose to be civilians.

Now, in that first group of eight women that were originally selected to go to flight training as pilots, two of those women were dropped from the program and never earned their wings. Today, two of these women are United States Naval Reserve captains. One has children. One of these women is now an airline pilot. The first woman aviator, Lieutenant Commander Barbara Allen Rainey, was killed in a mishap in a naval training aircraft in 1982. Her two children are now grown and are in college. Then there are two of us left on active duty, one of them with two grown children now entering college, and myself with a baby.

All of us are, I think -- self diagnosing here --essentially healthy people. We have a situation that was presented to us that we were not well prepared for, really had no idea what we were getting ourselves into, and we have managed to cope. As General Foote said, we were the charter members of the Uppity Women Club.

But all of you will not be seeing much of us, because this cohort group is slowly going into retirement. And if TriCare(?) is as bad as some people say, you won't be seeing us in military hospitals in our retired status. But you will be seeing that young lady and her husband and their children who were married in the Naval Academy, and she is now in flight training.

What is stress like in military aviation in the 1990s? Well, first of all, I would point out that it is not about pulling G's, physical strength, relief tubes, ejections, G law or any of the other things that are in the vocabulary about flying airplanes, because to people who fly airplanes, these are not big deals. They are very much up to the individual, and you prove your ability to handle that or not handle it by doing it. We have been doing it for 20-some odd years. The only stress in that part of it is all those people who are still asking the same dumb questions that they were asking back then.

The real stressor in military aviation, like in most of life, are what I call the jerks. If you remember, this is an environment in which it was okay to be a jerk for a long time. You take a distribution of what I call about 10 percent -- that is not scientific, but it is empirical --you get people who are five percent in the middle. They don't really care, as long as you can do the job. They have got bigger, more important things to worry. The other half of that remaining five percent can be extremely supportive of women. They have daughters. Their daughter is the born natural fighter pilot, and they are going to bend over backwards to support you.

Then there is that other two and a half percent that are just big-time, hostile jerks. They don't have to be men; they can be women, too. We are not immune from that kind of behavior. The real problem can occur when that distribution of the bad jerks is where they are in positions of command or leadership, when they are lieutenant commander department heads, when they write your fitness report, when they are your commanding officer, and they like to get their jollies by doing all those little things that they know get to you.

Sexual assault is really the odd-out. At least in my experience, that has been very rare, particularly for officers, probably less so for junior enlisted personnel. But the real thing that gets you is that day-to-day petty behavior of somebody who is always trying to undercut you professionally, like somehow, you are out there on the stage and everybody can judge you, and they are all making pronouncements about you, about your personal life and this and that. Boy, they know it, a friend in the BOQ told them, and it is God-given truth.

Then you walk out, and there it is on the bulletin board. Somebody has posted the latest Early Bird, which has a front-page article from the Washington Times or whatever, saying that the reason why the Navy is in so much trouble today is women. Wow, the

entire Navy was brought down by one female lieutenant that cried wolf at Tailhook. Wow.

That is a situation in which most of the time, healthy people, people who don't tolerate that kind of nonsense, can adapt to. But in military aviation, there is an environment in which professionally it becomes really acute. That is when you are in a situation in which you think somebody is trying to not only undercut your professional reputation, but go after your wings, to kill you professionally.

I would make a medical metaphor here. If you were a surgeon and people didn't want you to be a surgeon for whatever reasons, maybe you graduate from a military health institute, and they decided they were going to put you in green coats and single you out every day so that you could never escape being visually identified every time you walked into the room, and then you run across one person who just plain doesn't want you to be a surgeon, does everything so that you would lose your credentials. How do you cope with something like that?

I will also point out that that is the rare occurrence, it is not the norm, but it is the kind of extreme end of the spectrum that military women in aviation are up against from time to time.

Over the years, I have done a lot of informal counselling with junior women, and how do you deal with this. I like to use racial integration as a primary example. I use that because my first commanding officer was black at a time in which I think there were maybe five black pilots in the entire United States Navy. He taught me a lot about networking, and how you deal with an environment like this, in which your very presence in a world of average white guys will evoke stereotypes, and most of those stereotypes are very negative.

The other situation that I use as an example here is probably what it might have been like to go to be the first African-American student at the University of Mississippi in 1968. What do you do? I also use that as a perspective because, unlike those people who fought the brave fight for civil rights in this country, for the most part people are not fire bombing our children or doing those kinds of overt violent acts against military women. So whenever you are really feeling sorry for yourself or think it is tough, you have to remember that it is not that bad.

Military women, like women in non-traditional fields, walk a very fine line of what is considered appropriate, acceptable behavior and what is not. If you are too feminine, you are a floozy, but if you are too masculine, you are a dyke. You just never quite know how that is going to come down and how people are going to judge you there.

Everybody has to find their own way, and there is a balance there. But it is probably a pretty well-known phenomenon amongst the women that if you are a young fighter pilot, female, and you act like a young fighter pilot, you are aggressive, you've got a foul mouth, you walk in there, you know everything, just ask me, I'm the best stick around, you're going to have a hard time surviving your first squadron. Whereas, that same kind of behavior is going to be encouraged in a male.

On the other hand, there are a couple of advantages to being a woman. One of them is, you never lack for visibility. That is good and bad, but you are never quite invisible. That can be a good thing as well as a bad one.

A couple of observations that I will point out to you. Number one, as our moderator so appropriately pointed out, let's not give in to this group think. I am not a radical feminist. As I was telling Congresswoman Byron, the new definition of a radical feminist is a man who has a daughter at the Naval Academy. I am a radical individualist, because if I have learned anything in all of this, the toughest thing for me was feeling that I bore the burden of my class on my shoulders, that somehow, what I did or didn't do meant all women would be judged by me.

I was walking in a situation in which the presumptions -- and I think this is very true in the racial situation as well -- the presumptions are different. In flight training, when we have a young man going through to be a pilot, we presume that he is qualified to be there. He has to disprove himself, mess up in the airplane or do something in a certain pattern before we remove him from the program.

But with minorities, what happens is, the presumption is, you shouldn't be there. Somehow, you are not qualified, that you are affirmative action quota, or you took the seat from somebody better qualified. So you are constantly in a position where you are proving not only your individual ability, but that of your class as well. You have to overcome the negative. That is a tough situation to be in, particularly if you are not even aware that that is what is happening.

So I would caution, any time people start talking about groups and about how women might be prone as a class to do one thing one way or the other, always go back to the individual, because the distribution and the individual variance overcomes all of that. We will never have any chance for real complete integration in the armed forces if we don't start looking at each other as individuals first.

When people face discrimination, be it paternalistic, malicious or benign, the normal healthy reaction is anger and frustration. The real question then is, what do you do about it? Do you internalize it or do you do something positive about it?

We all work those things out in our own lives, but I think it is very important, if somebody presents what appears to be that situation to you, that you talk about it and you take the long-term perspective. It is not just about here and now, and how everybody tends to look at the whole world -- when you are 25 years old in particular, 30 years old is ancient, and everything is the here and now. You are really part of something that is much larger than yourself, and there is great value in what you do in the long run. Stand back and take a look at it.

Little things. In the aviation world, particularly in naval aviation, one of the things I have noticed that I consider particularly sexist, if you will, is this little thing called not aeronautically adaptable. In my 23 years, including command, in military aviation, I have never seen a male who completed flight school successfully branded not aeronautically adaptable. That means that you never had the right stuff to fly in the first



place. Yet, I have seen it in at least two cases in female military pilots. That stamp was given to them by a male lieutenant, relatively junior flight surgeon, who had never completed a residency in anything. If adult supervision, meaning the commanders, don't step in and knock that kind of stuff off, that person is professionally ruined.

Another aspect that you will hear a lot about, particularly in these studies, is what I call the personal life versus the professional. These are the issues that deal with pregnancy, being married, being a parent, how do you combine the two.

I will point out that the unique difference with women is the ability to become pregnant -- most women, not all -- and that once you have the child, you become a parent. So let's stop that classification of single parents somehow are all women, and that kind of mind-set that we deal with every day.

The issue that is coming up to the forefront nowadays as I get older is this issue of menopause. I can't believe that all of a sudden now -- people used to call me up 20 years ago complaining that they were getting harassed because they were pregnant, are now calling up and saying the Army is after me because I am menopausal. Somehow, and I have to be a little cynical or sarcastic about this, if all my male counterparts that exhibited what I would call raging hormones at their mid-40s were studied or analyzed like this, we probably wouldn't have anybody flying airplanes.

Birth control. Of all the things that make my blood boil over the years, stupid little policies like --when I was a flight instructor some 10 or 15 years ago in the training command, a Navy captain at the Navy Air Medical Institute unilaterally decided that birth control pills was grounding medication for six months. NASA wasn't even grounding women for taking birth control pills. What had been studied more?

Of course, what happens is, if you ground a student naval aviator, they get so far behind their peers that they might not even keep their seat in flight school. So what do they do? They take them and they don't tell you, they lie, because you have created an institutional barrier.

Another problem that we experienced some years ago, and I think has been rectified, is the idea that you could only get birth control pills in three-month supplies, and deployments were six months. When you started investigating why that was, it had something to do with cost. It was cheaper not to keep the medications in stock.

Then there is that joke about how female naval aviators only have six-month pregnancies, because we don't tell you, because we don't want to get grounded, because if we get grounded for nine months, we lose our flight pay. I don't know why it is that nine months is the magical number, but the little things like that.

The lesson of all that is, you can have it all, but it is not easy.

The politics of it. We talk about war and combat, but probably the most stressful thing we have seen over the years, particularly the more senior women, is what I call the culture wars. That is what happened in the aftermath of Desert Storm, while the debate was going on about women in combat. Military women got caught very much in that crossfire.

We do not want to politicize pregnancy, parenthood, menopause or any of those other things, post-traumatic stress. My recommendations to you as health care providers are: judge people as individuals first, don't try to find things and group characteristics that aren't there, particularly paternalistic over-reactions. The idea that somehow, women can fly airplanes when they are pregnant, but if I am aboard a ship, I cannot even go to sea aboard that ship unless I am within so many hours of being flown off, to me is just nonsense. I am more at risk on a trans-oceanic airline. I am more at risk of having appendicitis than I am an ectopic pregnancy. Perspective.

We talk a lot about how you prevent child abuse, and the signals that you look for when a patient presents themselves. Perhaps we should start talking about what I call command abuse. If you have a lot of women from the same command coming in with the same problems, maybe there is a root cause there.

I talk about pregnancy, particularly among senior enlisted, as the visible barometer of command morale. When young men want to get out of a bad situation, they don't like the chief, they don't like whatever the situation is, they can always engage in a pattern of misconduct to get discharged. Under our current policies, a young immature woman who is not thinking about the long-term consequences can do the same thing by getting pregnant. On the positive side, most of my career I have been in commands in which with good leadership and good morale across the board, we have low rates of drug problems and low rates of pregnancy.

The idea is to get everybody up and ready, not to disqualify. If you have that attitude towards people, they will be far more likely to come see you.

In closing, I will go back to the storybook wedding, because there was something about it that was still disturbing. The young bride wore a beautiful designer wedding gown. The young groom wore his uniform. Now, before I am too judgmental, I think she got the gown for free, so maybe that was a factor. But it speaks volumes about how you see yourself in an institution.

When my husband and I were faced with that situation, we decided we would both be married in civilian clothes. The more common manifestation of this is the dining out, in which your military spouse and you are invited, and you decide you are going to wear an evening gown while he goes in his uniform because, well, it is not your command. Wrong. If you are a military officer or a military member, it is as appropriate for a woman to wear her uniform to such an event as it is a man. But that is a manifestation of whether you see yourself as a military member before you are a woman, or whether being pretty or being attractive is more important on that occasion.

That goes back to my general prescription for how we solve most of our gender integration problems in the military, which will never be solved 100 percent. But the first and primary step is that we see ourselves first as human beings, and we apply the Golden Rule to how we live and how we treat others, then we are military members, officer and enlisted, who swore to uphold and defend the Constitution, and then we are whatever we are, second, third, fourth, fifth.



DR. HOLLOWAY: Are there any further questions?

If not, then it is my pleasure to introduce a very old friend who I have known since she was in residency, Major Loree Sutton. Loree was deployed in Operation Desert Storm as division psychiatrist, 1st Armored Division, and took that opportunity to create not only a family support program that was exemplar in Germany, but put together a set of papers that were really quite remarkable, and eventually changed many of our operational principles, both how we deploy medical resources, and some of how we deploy some armor resources after their study in the chief of staff's office.

She has done a tour here at USUHS, and at the present time is out at Fort Leavenworth, where she has just completed her year out there.

MAJ. SUTTON: Thank you. Well, it is indeed my pleasure and privilege to spend a few minutes with you folks today, sharing a few thoughts and perspectives from my experience as the division psychiatrist for the 1st Armored Division during Operation Desert Storm.

My hope is that what I say here and now will generate far more questions than answers. I look forward to a lively discussion, maybe even a debate, during the period following. What I plan to do is, I would like to address three areas, the first being to paint a picture for you of some of the stressors that 1st Armored Division faced, men and women alike, during Operation Desert Storm. These included environmental stressors, they included communication stressors, and of course those stressors which the enemy was only too happy to provide.

The second area I would like to cover is, if you will indulge me, allow me to tell you just a few war stories. Harry, I know you have heard some of mine. I tried very hard to focus on those you haven't yet heard, but to illustrate a few of these experiences of some of the women who served with 1st Armored Division.

Then lastly, I would like to offer just a few take-home points which have been useful for me in conceptualizing the role that is played by first of all individual service members, some of whom happen to be women, sailors, soldiers, airmen, Marines, secondly, the role of leadership and thirdly, the role of policy.

So having said all of that, I need you to listen fast, because I am going to pack a lot into these few minutes.

I would like to rewind back to the winter of 1990 and 1991, where in Germany there were 16,000 -- what we called iron soldiers, 1st Armored Division, affectionately known as Old Ironsides, who were recovering from an identity crisis experienced over the previous year, during which, you will recall, at the end of 1989, the Wall came down, there was Operation Just Cause in Panama, where the largest tank that was employed was an old Sheridan. We were sitting there with our M1 70-ton, behemoth steel dinosaurs.

Well, at the end of that year, you recall the NZO lead division in the ground war. Our job was to take on and destroy the Republican Guard. This is not a paid political announcement. That is nothing like the United States.

But let's get back to the 1st Armored Division. What was it like, the stressors?

First of all, there was one huge stressor as women that I recognize now that I think most were ignorant to at the time. Certainly, Operation Just Cause in Panama had set the stage for women exposed to more extreme risks than our current modern-day battlefield had introduced to the American public. But little did we know at the time that Operation Desert Storm was to provide really the stage on which we as women and men of the armed forces would show the entire world just what we were and possibly were not, in the eyes of some, capable of doing.

We also encountered the fear, the uncertainty, the fatigue, the process of preparing oneself to die, writing the last letter. When we got there, no one was prepared for the cold. We thought it was the desert, we came prepared for desert weather. It was cold. There were icicles at night in our sleeping bags. Of course, as spring turned into summer, the eventual heat.

There were privacy issues. I think as a woman, certainly I experienced this on a very personal level. The latrines that Professor Joy showed us earlier this afternoon, well, modern technology being what it is, we no longer, at least in Desert Storm, had just a one-over, we had four in a row. I can remember thinking during one particularly difficult afternoon, where we had 10,000 soldiers who were crowded into a staging area that was designed to hold 2,000 soldiers, how nice it would be if no one joined me that particular moment as I sat on one of the four holes.

Well, a soldier did open -- I knew my job was as division psychiatrist, so I really needed to be involved in whatever experience this soldier was having, and it was such a relief to find the soldier said hello, returned my greeting, and both of us sat there side by side, seemingly happy and relieved that neither one of us knew each other, therefore, neither felt any particular responsibility to engage in conversation. That was a blessed moment of privacy.

There were issues of hygiene. We were told initially that sanitary napkins, tampons and the like would not be provided, but that once we got there on the ground, if we just brought our first couple of months' supply, that we would be taken care of. Well, we were very excited to greet the arrival of the first sundry packs. Much to our dismay, as we opened them up, we found something to address jock itch, we found razors, we found shaving cream. We even found some cologne, I'm not sure how that got through, but there were no women hygiene needs. Again, a message at least to anyone thinking about it, that you all aren't still really part of the team, even after 20-plus years now of integration.

It seemed to me that during that period, both leading up to combat, during combat and after combat, -- one of the readings from my last year -- Professor Holloway mentioned it -- at Command and General Staff College really just resonated with me, the writing of a Prussian soldier-statesman, Clausewitz, who talked about how in war, everything is simple, but yet, it is the simple that becomes so difficult. Is it any wonder that women have even greater problems with urinary tract infections, as our Speaker of the House has gently reminded us this last year? I don't know about the piggies in the

trench. I didn't see men or women, either one, enjoying living in the trenches. But when the process becomes that of not only taking off all of your gear, but stripping down your weapon, your chemical mask, not to mention the uniform itself, a woman becomes very vulnerable in a combat environment. I know for me personally as well as many of the women I dealt with, that became a factor that led to them delaying any efforts at personal hygiene and relieve themselves throughout the experience.

I would like to move on now to a rundown of some of the communication stressors which we faced in 1st Armored Division. First of all, there were issues of the busload that I rode on to the airport at Ramsar, the issue of, what is it that we talk about when you are preparing to go into combat? Well, it became very interesting to me. I was certainly dealing with my own personal feelings at the time, but I was also very much aware of being in the role as division psychiatrist.

Conversation at first was muted, a few anxious giggles, and then really focused on peoples' fears of death and secondly, mutilation or being wounded. About 10 or 15 minutes into this conversation, all of a sudden I was struck by the fact that the women on the bus seemed to be much more focused on their fears of death, whereas the men seemed to be much more focused on their fears of injury or mutilation.

Well, eventually, there was one male soldier who I think spoke perhaps for some of the rest in a very poignant manner when he said, well, guys, let's just put it this way. When the women were saying, how can you say you would rather die than come back injured, he said, let me just put it to you this way. My wife has told me that -- and I'll paraphrase here -- if my private parts are broken, don't bother coming home.

Once we arrived in the desert, our plane circled and circled. In fact, at this point we were no longer able to communicate directly. The noise was such that it provided a blessed few moments, in fact, hours of privacy, but at some point it became interminable, as we realized we were going in circles. Well, we found out that in fact the issue was that there was a threat of terrorists on the ground, and it had been communicated to command, and that in fact, we were not allowed to land until the site had been cleared and investigated for the presence of terrorist activity. So, welcome to Operation Desert Storm.

Then there were communication stressors within units, as people, 16,000 strong in our division to begin with, greeted an additional 8,000 to 10,000 newbies, the new soldiers who were added to plus up our existing units. There were the inevitable issues having to do with rivalry between men and women, women and women, men and men -- anyway, all three of the combinations, and jealousy as well as certainly some harassment.

One of the interesting experiences I had related to the issue of newbies coming on board had to do with a brigade command sergeant major with whom I had worked over the past year. We had a battalion that was actually on their way to the tanker Olympic, and since I had been their stress coach for the past year, he pulled me aside. I says, how are you doing, Sergeant Major? He says, Doc, never in all my career -- he says, you're not going to believe this. I said, what's up? He said, my chief mechanic, probably the

most important person that I am looking for right now to come in and take care of this brigade, she is a woman.

Well, I didn't know if I had arrived or not, in terms of the Sergeant Major talking to me about the horror of having a woman coming into his brigade, while I was sitting there as a woman. But I think it illustrates some of the points that Captain Mariner made in terms of there being this process of denial that operates for those who are pioneering in the beginning phases. At first it is impossible, as General Foote mentioned, for a woman to do the job, but then when a woman does come in and do something that resembles competent work, well, she is not an ordinary woman, she is something beyond a woman, and it becomes this repetitive process of experience to wipe out the cobwebs of ignorance which continue to exist in our military.

Well, I am happy to report with this particular command sergeant major, a week later -- and I asked him, what are you going to do? He says, well, ma'am, I am a professional, I'll do the best I can, I'll take care of her. So a week later I made a special point to go back to that brigade. Sergeant Major, what is going on? He says, ma'am, he says, I didn't want her, I fought tooth and nail before she got here. He said, try and take her away from me now. She is the best something-or-other something-or-other mechanic, -- which is a great compliment coming from this sergeant major -- that I have ever seen in my entire career. That is the kind of educational process that I think all of us have addressed in some way this afternoon.

Then there were the communication stressors between units. It was easier to call around the world using AT&T when the phone banks were eventually set up than it was to contact a unit that was two miles down the road. We had no roads. Thank goodness for the Loran Company, which provided navigational devices which allowed us to creep along 50 feet at a time, shooting azimuths as imaginary terrain features, and somehow we managed to muddle through that. But again, a tremendous stressor.

Finally, the home front stressors in terms of communication, the tremendous vacuum of vulnerability that was created from the time lags. You send a letter off today, the soonest you could hope to get any sort of reply might be four to six weeks down the line. The phone banks helped somewhat when they were put into place, but again, they created their own set of circumstances, as providing part of the communication solution, in terms of higher phone bills, and the difficulty of resolving issues on the line, saying goodbye, hearing the voice, getting into a fight and then having no way to really resolve it.

The first letter I got from my mother in the Gulf addressed the issue that Dr. Wolfe mentioned, in terms of the varying types of exposure and experience within the Gulf. I got this letter. Actually, she mailed me a little trip diary which listed the various hotels and foods and experiences on a daily basis. Then she went on to say, Loree, I am so happy to know that you are going to be able to get some shopping in over there, I saw it on CNN this afternoon.

Well, the 1st Armored Division being part of the left hook, when I looked around

and imagined shopping edifices and hotels and restaurants, I could only figure out that there must be a different planet out there somewhere, but I certainly was not on it.

Moving on to a few war stories that I think illustrate the experiences of a few of the women in our division, the first one being what I experienced. Having a division-wide mission meant that those before as well as after combat. I did a lot of driving. One day, I happened to see a little roadside stand. This was in Saudi Arabia before combat began. My driver and I thought, hey, great, let's go in and see -- we haven't been to a Saudi Arabian store yet, again, not hardly the shopping that my mother had envisioned, but they had a few bags of pita bread and some almonds, and I thought that would be a great boost compared to the MREs that we had been eating.

So my driver stayed out with the humvee, I went in and picked up a few of these things, and tried to pay for them. Well, it was the strangest experience I have had in a long time. It was one that took me a few moments to really decipher. It was the experience of being absolutely invisible. There were no other women in the store. I was walked into, again, like I was absolutely not there. I even found myself saying, excuse me, excuse me. The man at the cashier would not look at me, would not take my money, and in fact, I ended up having to go out and get my driver, give him the money, once I realized that there was nothing I could do or say or be other than who I was, and that was not going to allow me to get any sort of attention or respect in this environment.

It brings up actually a riddle that was going around at the time, talking about the stressors provided by the enemy. The riddle was this: how do you tell who the real enemy is over here? Well, folks are saying it is the Iraqis; they are the nice ones. Well, I don't know that that is particularly the case, but it certainly was an experience for me about the cultural factors that can influence both men and women's experience in combat.

I would like to also give you another war story, this one having to do with a driver, a woman driver, a young reservist, who arrived in the desert two days before the beginning of the ground war. She was an administrative clerk by trade, but we didn't need administrative clerks at that time. What we really needed was fuel tank drivers. So she had her first experience two days before the onset of the ground war. One of the sergeants took her out and said, today we are going to teach you how to drive forward. Tomorrow we will teach you how to go in reverse. We don't have enough people to give you someone to ride shotgun with you. It is going to be you in this truck, and I am going to teach you how to drive it.

Well, indeed, the first day he taught her how to go forward. The next day, as it turned out, the ground war started earlier than had been expected, and she did not get her lesson on driving in reverse. Well, it turned out to her advantage, because when we launched into the ground war, we were in the midst of a great shamal, which is their nasty, nasty wind-mud-rain-sleet storms over in the desert. Whereas our other fuel tanker drivers would get out there and get stuck in the sand and the mud and the grit, first go forward, then go back and then go forward, she only knew how to go one way, and she ended up going further than any other fuel tank driver in the entire division.

Another war story has to do with the experience that I observed all over our division with reference to safety arrangements. When we first got over there, sleeping arrangements were something that was worked out at troop level. What happened mostly was, working groups set up their tents and slept together in the tents, and worked out privacy issues and all the rest, men and women together, brothers and sisters.

Well, several weeks into operations in the ground war, unfortunately one of our lieutenant colonel battalion commanders was found in a compromised position with his young female driver. The reaction at policy level, from the division at that point was, that's it, the problem here is that we have got men and women who are sleeping together all over the division. This will never do. There will now be women tents, there will be men tents, and never the twain shall meet.

I will tell you, as division psychiatrist, I encountered more adolescent, destructive -- just yucko behavior from that point on related to that particular policy than could really even be believed. Never underestimate the power of the no-no factor and of re-introducing the notion to people that they really are different, they are men and women first, as opposed to soldiers, sailors, airmen and Marines.

A last war story I would like to share with you has to do with the period of the ceasefire following combat. We were all aware going into it of the stressors posed by the enemy. General Schwartzkopf had told our division commander that we were to anticipate taking 10,000 casualties, roughly half of our fighting strength. We had prepared ourselves the best that we could possibly prepare ourselves for that possibility.

We were also prepared for the terrorist problems, we were prepared for the uncertainty, to the degree that we could be. But what we were not prepared for, I think, was the stressors provided by the enemy, who turned out to be ourselves and each other. This manifested in the form of traffic accidents caused by at times little to no sleep, at other times, daredevil behavior, the stressors of friendly fire, the stressors of harassment, which becomes toxic in a unit environment, particularly with life and death issues in front of us, as well as the stressors of turning on ourselves.

We had two suicides in our division during the Gulf War. I think there were seven or eight in the theater. One of those suicides was a woman, a young lieutenant, West Point graduate.

But it was during this period of the ceasefire that I think our division really experienced the greatest amount of stress. Up until that point, we had done all of the things that we had been trained to do, but no one had ever trained us, or even anticipated the possibility of sitting straddled between a rock and point in a grave field, in a minefield, with our adrenalin pumping full speed, and no place to put it, nowhere to go.

It was during that time that the cluster bomb deaths started to occur with increasing regularity throughout the theater. We were fortunate for the first few days, but inevitably, the same pressures certainly occurred in our division as people raced to get souvenirs, rusty Republican Guard license plates, going into bunkers, getting things to take home, something to validate one's war experience.



I was called one afternoon to the scene of our first cluster bomb death. There was this young specialist who had wanted one of these license plates, and finally after several days wore down the sergeant, who finally agreed to let him go out and get the license plate, having given him instructions to follow foot by foot, step by step in his footprints as they went out to get the plate. Well, the specialist did that, but unfortunately, for whatever reason, the cluster bomb exploded and the young specialist died.

Well, little knownst to me, our graves registration person who was also called to the scene turned out to be this specialist's fiancée. I must tell you that for as much as certainly our diverse current force to include men and women of all races, has enriched our fighting ability, it has also complicated the kinds of relationships and friendships that one will run across in a situation like this.

Lastly, what I would like to do is, I would like to talk about the take-home points I mentioned before, addressing the role of individual service members, of leaders and of policy.

I think, echoing the points that have been made previously, as individual service women, it is critical to develop -- if you don't already have one going in, to develop a sense of humor. Without it, you are gone, you are dead in the water. It is also important to develop a sense -- not only a sense, but competence, real competence, that can be demonstrated. Know your job.

I talk to young women and men about this in uniform all the time. Have a sense of humor, be competent at what you do, develop the ability to focus on those things that you can control and let go of the rest. You can't control what those 10 percent or two and a half percent of the jerks are doing out there, but you can focus on being the best soldier that you are, and doing your job and having a good sense of humor to resolve whatever you can, and to clear through those webs of ignorance.

I think it is also important as individuals to answer the question which was brought up again earlier in terms of respect versus being taken care of? It is a particularly poignant issue, I think, for women. We are socialized as young girls to be taken care of, to be looked out after. In uniform with life and death issues in front of you, is it going to be respect that you aim for because you can do your job and contribute to the mission, or are you going to look to what may feel better or is more natural, and that is being taken care of. A critical issue to address, very different consequences.

The next issue for individuals, I'd say, is to find a way to become a functioning part of this team, to be a team player, to become a brother and sister in arms. It is truly the glue that keeps us together as a fighting force.

The next issue has to do with the responsibility. I think this is something that General Foote had mentioned, as far as the responsibility that each of us, particularly as pioneers in whatever field we are in, but as women have in not only doing whatever we can to contribute individually, but taking on the responsibility of educating folks who are out there, getting through those cobwebs of ignorance, and developing the broad strong shoulders that will allow the future daughters and sons of America to stand on our



shoulders, just as we stand on the pioneers who have gone before us.

Finally, as individuals, I think it a tremendous privilege that anyone who is in uniform ought to allow themselves to experience, to be able to serve alongside of the best soldiers, sailors, airmen and Marines in the entire world. That is at the individual level.

For leaders, I think it is essential that leaders recognize that the little things count. It is leaders who maintain the focus on soldiers as being human beings first, as being the trained professionals that they are, who may happen to have individual needs related to their gender or dietary preferences or medical needs. It is leaders who can lead the way in terms of paying as much attention to asking the right questions as to providing the right answers. If you don't ask the questions about the experiences your soldiers are having, you will never know the answers.

It is leaders who must recognize that while much of what still remains in our military is ignorance with reference to integration of women, it is no less destructive. Much of it can be dealt with with a sense of humor, with leadership from above, but there is that element of it that is purely malicious, and it is that element which the formal structures of grievance and redress are in place and must be respected and maintained as viable options for male and female soldiers.

It is also leaders who provide the glue that keep our combat family together, and it is leaders who I think owe their soldiers, sailors, airmen, Marines at least two things. They have got to expect the best from their folks, and in doing so, they have got to give them two things. One is the means, the second is the opportunity for each woman and man in the armed forces to do their job, perform to the highest standard, and to continue this process of education that we have talked about.

Finally, policy. I feel like I am sort of preaching to the choir here. I've got to tell you how exciting it is for me to come to a conference that brings together the policy makers, the scientists and clinicians and educators and academics, the leaders and students all together in one room, to put together our best thoughts and ideas to help each of us do our individual jobs better.

It seems to me that good policy must be at least three things. It has got to be timely, it has got to be relevant, and it has got to be based on the best available evidence that we have at our disposal. That is a continuing process. It is policy with a little P, not a capital P. It is living policy that can adapt and change as we do.

Finally, in closing, it seems to me that after all, the military is less of an organization, but more of an organism, a living organism, one that both lives and breathes and laughs and loves and grows, at times whines, hopefully survives, and with the help of each one of us in this room, will thrive and continue to do so as we face the enormous challenges that lie ahead.

DR. HOLLOWAY: Are there any questions?

PARTICIPANT: Could you give some idea of what the composition of the genders were of the 60,000-plus, number one? Number two, the problems that they had and the number of psychiatric problems. Finally, could you a little bit talk about policy.

MAJ. SUTTON: Let me just say that I unfortunately do not have a systematic way of addressing your question. There has been a study that was initiated in the Gulf that is being carried through by the Walter Reed Army Institute of Research. I think they have got some preliminary findings which may already be out on the street. But that certainly will be one way of getting at the issues that you mentioned.

From my experience on the ground as a mission psychiatrist, at the time I was aware of these issues, particularly concerning the new soldiers coming in, many of whom did happen to be women. I can't give you a percentage on that. I will say as a broad brush within our division, I think it was between five and eight percent of those 25,000 that eventually went into combat who were women.

You will think back to the 13 or 14 percent figure that was mentioned before and wonder why the discrepancy. Well, this being a heavy armored division, of course, it was more weighted towards the male fighting combat power.

What I experienced as a mission psychiatrist being called to various units that were having difficulties around the desert, the harassment issues I would say were weighted towards women having the difficulties. But the interesting thing there was, I didn't get a single referral from an individual woman. The referrals that I got were from women within the same unit who had banded together and had then brought that issue to their commander's attention. It was from that springboard that I would use that then to bring it up as a general command issue.

There were issues of physical assault which in the cases that I worked with were more directed towards male soldiers. But the verbal harassment and sexual harassment, that came to my attention from bands or groups of women.

PARTICIPANT: Just to touch on two brief issues, I was a Navy reservist who was participating in a field exercise over in Korea a few years ago. Some of the berthing issues we dealt with, we did a lot of the team process, how are we going to deal with this, because we were actually an Army-Navy MASH unit. We ended up having gender-specific tents, but enlisted and officers berthing together, which was a novel concept for some of the Army people, but it was a very good point as far as demonstration of camaraderie, that all of us had to get up and do the two-hour watches, to staff those silly diesel fuel heating tents. We all had to do that. So it was a really good learning experience for all of us.

The other issue that I have been involved in is, I was a Navy reservist recalled to active duty during Desert Storm, but I remained in CONUS. So there were a lot of issues there that those of us during that time had to deal with, because we were participating in Desert Storm, but yet we were not recognized as really Desert Storm, because we were still in CONUS. But yet, I was attached to a field hospital, which also meant that I was still on tap for overseas service if and when the war expanded, that I would be the next to go.

So especially those of us who were mothers found that, because a lot of us were geographically reassigned, so our kids were upset that Mom is gone, but she is still in the

country, but yet she may end up going to war. That was a whole other compounding of issues, not only for us, because we never knew when we might get that phone call saying to pack your bags, you're going next week, and having to call our kids.

MAJ. SUTTON: I would certainly agree that the anticipatory stress can be in many ways as difficult, sometimes more difficult to deal with than when you are actually out there, despite the dangers, because you have got something to focus on.

MAJ. SUTTON: And I think that is an issue that has not been given enough attention.

PARTICIPANT: I have a comment. Major Sutton was talking about the stressors during Operation Desert Storm. She was talking about the stressors in the wartime environment, pretty much, but there are many stressors back here in the States, at the post, the wives stayed back, and many of the wives whose husbands were sent there didn't know how to write checks, didn't have a driver's license, couldn't drive, had no food, no money. A lot of times when they had their meetings -- I am talking about the meetings at Fort Bragg -- the commander's wife would call for a meeting, she would have the officers have one meeting and the enlisted have a separate meeting.

Well, I was in the military as an enlisted, so I met with her personally. I told her, the only way we're going to get this thing going together is teamwork. Don't separate them, keep both of them together and we'll do pretty good all at one group meeting. So we did that and it worked out fine.

The questions that some of the wives wanted to know seemed strange at first, but every question was very important. One of the first questions we got from the group was, can I bury my husband at Arlington Cemetery if he gets killed. You heard that was important. So we asked all the questions and worked together as a team and we did better as a team, with everyone working together.

DR. HOLLOWAY: I want to comment on this discussion that is going on right now, just in general. You saw in Colonel Joy's slides these complex pictures of ways we kill each other, and the bad things we do to each other. It requires, as the point he was making, a tremendous logistics operation to do that. That logistics operation comes all the way back here into the homes in the United States. It never occurs just where the war is going on. It stretches across all of that.

So there is this broad range of expression, and it may be one of the things you want to discuss here, because that extension occurs for both genders, all the folks who are deployed in that circumstance. So I think these comments are very much to the point.

I think we ought to move ahead with our last presentation now. It is my pleasure now to introduce Lt. Colonel Aune, who is of the U.S. Air Force, who demonstrates a great principle of USUHS. That is, if you come here with some talent and extensive background, what they kill you with is the other jobs assigned. She has a Ph.D. in educational administration from the University of Utah. She took her initial degree, a BSN in nursing, in St. John's College in Cleveland, and her M.S. in the School of Nursing, the University of California at San Francisco.

She is here to talk about those other jobs as assigned, as the associate dean and the chairman of the Department of Nursing Research, and also fills that very important role of being commandant for the nurses and nursing students. I think this is really the heart of educational leadership for a military school.

She is going to be talking to us about an event that goes back to Vietnam, and giving us a perspective that comes from the Baby Lift.

LT. COL. AUNE: Being a qualitative researcher, and I get teased by all of my department about qualitative researchers being story tellers, I am going to approach this a little bit differently. I am going to tell you a story and let you figure out, which you will be able to do very easily, what some of the issues are that face any of us in the military, men or women, who are called upon to do humanitarian missions that have sort of become the cottage industry of the military of late. We have done more and more of them. That is not to say that we haven't done them all along; we have, right along with our regular operations. But it seems as we moved into the late 1980s and the 1990s that we do them extensively, and they have become really a whole other operation that we carry on. In fact, we now call them operations other than war in many cases, and they are humanitarian missions.

Operation Baby Lift took place in 1975, so we are talking about 21 years ago. To give you a little bit of background about Air Evac, I am sort of in a traditional role, because Air Evac nurses have been around since the Second World War. Army nurses started it, evacuating all the wounded from the Second World War, and continued on in the Air Force when the Army and Air Force became separate entities. So the Air Force nurses continued it on.

It really wasn't until after the Korean War that male nurses were allowed in the Nurse Corps, because prior to that, men could not serve in the Nurse Corps; you had to be a woman to be in the Nurse Corps. So that is more of a traditionalist approach, if you will, that Air Evac nurses have been a part of military nurses for well over 50 years now.

Anyway, to tell you my story and let you figure out some of the issues that confront any of us when we are involved in a humanitarian mission, I am going to tell you what happened in April of 1975.

The first thing I can say about Air Evac nursing is that the only certainly in Air Evac nursing is that it is a very uncertain proposition from the word go. You are alerted for your missions, whether they are your regularly scheduled missions or your alert missions, whatever day you are going to carry them out.

The only thing you know is that you are going to fly an Air Evac mission. You may have a manifest telling you what kind of patients you're going to have, what kind of a mission you're going to have. That does not necessarily mean that that is how the mission goes. And you are never quite sure where you are going to spend the night at the end of that day, when you have carried out the mission.

As I was listening to the other speakers and thinking about what I was going to say, I thought, now, could I tell them about a mission that went from the beginning to the

end the way I anticipated it in my entire flying career, and I cannot think of one mission that went according to plan. Something always happens. So that is what I mean when I say Air Evac is a very uncertain proposition.

It certainly was in 1975. The Air Force in its infinite wisdom at that time had decided to change Air Evac operations completely around. It had been delegated out to various commands, and all the squadrons that flew Air Evac belonged to several different commands within the Air Force structure.

In 1974, the Air Force decided it should all come under one command. We can imagine, because we are all going through versions of that now, what it is like to go through a transition when the structure of your organization is changing, and that was what was happening.

In addition to that, my squadron, which was assigned to Travis Air Force Base in California, was going to go away. We were going to be merged with the squadron at Clark, we were going to be no more. So we were mourning the loss of our squadron, because we were going to become another entity. We were going to become the knife instead of the tent, and so all of our history and tradition to that point was going to be merged, and some of us I think feared, forgotten.

In addition to that, the squadron that we were going to be merged with was a C-9 squadron. Typically, in the Air Force at that time -- because it has changed -- the major aircraft for Air Evac missions were C-130s, C-141s and C-9s. Some squadrons flew only one of those planes, and the 9th was one of those squadrons. It flew only the C-9 in the Pacific region, Japan, Korea, the Philippines, that area of the world.

My squadron, on the other hand, flew all three of the aircraft, because we had the entire West Coast of the United States from the North to the South Poles to the middle of the Indian Ocean as our territory to fly. Now, that wasn't our regular missions, but that was what we combed for our alerts.

In the process of the transition, we were learning to work together as two squadrons to become one, which also meant that the 9th Group folks had to become certified or qualified in the other two aircraft. We were doing some switches back and forth, and flying each other's missions and qualifying the 9th people in the other aircraft. So we were all pretty much in instructor roles from my squadron.

However, if you recall the history in terms of 1975, it was two years after the end of the Vietnam War. It was two years after the POWs had come home. But we still had a small military presence in Vietnam. April of 1975 was actually the year and the month in which the Republic of South Vietnam ceased to be, and fell.

So by the early part of 1975, conditions for our squadron flying was rapidly changing, because we didn't know what was going to happen. In April, when I flew over to Clark to spend a month flying C-9s in our switched positions, we were always briefed by the chief nurse of the 9th Group squadron, as well as getting our own missions for the 141, because we still had to continue flying all of the regularly scheduled AIREVAC missions for both squadrons while we did all of this crossover training.

The chief nurse briefed the five of us, the medical crew members who came in from Travis, ten group members and one reservist from the 65th, that there was a possibility that we would fly some humanitarian missions or some AIREVAC missions in Vietnam, but as to what they would be and what kinds of missions they would be, there was no clue.

We got to Clark on a Wednesday. One of my fellow squadron mates pulled the alert for 141s on Thursday. We pulled alert from 0800 to 0800, for a 24-hour period. My day to pull a 141 alert, which meant that I could go on any kind of an AIREVAC medical mission anywhere in that Pacific region, was from Thursday morning at 0800 to Friday morning at 0800. Then I was scheduled on Saturday to fly a three-day mission to Japan on C-9s. So that is what was scheduled. However, that is not what happened.

About 6 o'clock on the morning that I was due to finish my 24-hour alert status, the phone rang in my BOQ room at Chambers Hall. If any of you have been to Clark and ever saw Chambers Hall, it was sort of like a big hotel, where some of the permanent party lived in one wing and all the TDY folks lived in the other. Sometimes we were so crowded in there that we had to share rooms, and that was the case this particular April. We were sharing rooms. I had one of the reserve nurses sharing a room with me.

Well, the phone rang at 6 o'clock, and it was our scheduler, who said, this is an alert call. Everybody is on alert, though, it is not just for you. I am sending a crew bus to pick up all the flight crews that are at Chambers Hall in 15 minutes. Can you get everybody up and tell them to get ready to fly, and bring your flying gear. Don't worry about checking out of the rooms, just be ready, and come over to the 9th Squadron briefing room.

Well, needless to say, I got my roommate up, and we ran through the halls, pounding on the doors, waking everybody up and saying, get up, you've got to get your flight gear and get ready. The crew bus will be downstairs in 15 minutes to pick us up and take us to the squadron.

So in fact, it was there at 6:15. We got over to the squadron, and as often occurs I think in missions like this, or in situations like this, there was a lot of confusion and a lot of uncertainty as to what was going to happen.

So we all got there, we all signed in and did what all good Air Force officers and enlisted medical people do, we got our cups of coffee and sat down and made small talk, about wondering what on earth we were going to do, because we had no idea of what our mission would be, where we would go, anything like that.

A little while later, the chief nurse came in and said, we are going to start flying some humanitarian missions into Saigon. There have been requests to remove some of the folks that were in the hospitals, et cetera in the Saigon area out. So everyone assumed that we would use one of the planes that was typical for AIREVAC, thinking that it probably would be a C-9, since we had more of those immediately available, although they are much smaller than the 141.

However, the chief nurse came back in and said, no, we are going to use a C-5.



The C-5 had never been used for an AIREVAC mission. Many of the crews present there had never even been on C-5s. Then I was named the medical crew director. I was a first lieutenant at the time, and they said I was the medical crew director of this five-person medical crew that was going to go to Saigon on a C-5, on a mission that we didn't know what it was, other than it was an AIREVAC mission.

So we proceeded to gather up as much medical gear, and blankets, pillows, whatever we could take with us, not knowing what kind of mission we had, other than an AIREVAC mission, took it with us and went out to the aircraft. Standing by the side of the aircraft was the flight crew. In typical AIREVAC fashion, normally we tried to -- the medical crew director tries to give the aircraft commander a brief on what kind of a medical mission it is going to be, and anything that the individual needs to know in order to fly the aircraft safely. Likewise, the aircraft commander normally gives the medical crew a briefing on what to expect in flight, what weather conditions, et cetera, what altitude they are going to fly the plane, who are the armed crew members, et cetera.

So I walked up to the aircraft commander and said, hello, and he said to me -- and I will never forget his words -- he said, hi, I'm Captain Bud Traynor. He said, I'm the aircraft commander and I have never flown an AIREVAC mission in my life, so you have to tell me what to do. I said, well, I'm Lieutenant Regina Aune, and I am the medical crew director, and I said, I don't know what our mission is, other than it is an AIREVAC mission, and I said, and we have never flown on a C-5. So we need to learn this aircraft.

So I said, once we get airborne, could you have some of your crew teach us this aircraft, because we don't have any checklist, we don't have anything for this particular aircraft. So he said, sure. So our whole mission trip to Saigon that day was learning the aircraft in terms of what we could do with it for an AIREVAC mission.

I don't know if you are all familiar with the C-5, but it has got two levels. It has a cargo compartment in the lower half of the aircraft, and then there is both a fore and an aft ladder. The fore ladder leads up to the flight deck where the flight crew sits, and the aft ladder leads up to the troop compartment, which has 75 airline passenger seats in there, and is configured much like a civilian aircraft, except that the seats face rear. It also has a galley for preparing meals. You can only get from one area of the aircraft to the other, if you are up on the flight deck or the troop compartment, by going down either ladder and walking the whole length of the cargo compartment and up the other ladder. There was no way to get between, even though you are on the same level.

So we surveyed the aircraft. We had a load of cargo to take over. Then we spent a lot of time learning the emergency and safety equipment on board the aircraft, in addition to what capabilities we had, and trying to memorize all this as we went, to figure out what we would do on this still as yet unknown mission, as to how we were going to handle patients in this particular environment.

Well, if you have ever landed in Saigon in April, it is about 95 percent humidity and 95 degrees temperature, and if you land on a very active, busy runway, it is many, many degrees higher than that. That is exactly what we faced when we landed there.



There were many planes. We pulled off on a taxiway. We were followed in by a 141. There already were C-130s from the Australian Air Force there, and there were a couple of European aircraft there. It was total chaos. In between all of this, the Vietnamese were practicing touch and go, so it was constant traffic, constant activity on the runway.

So we offloaded the cargo, and the aircraft commander requested that the entire flight crew -- and we had an augmented flight crew, so we had two flight crews on board, and the medical crew, come up to the flight deck. They asked the loadmasters to stow the ladders and close up the plane. So we were inside the aircraft, completely closed up, waiting for the aircraft commander and the copilot to come back from the command post to tell us what our mission was going to be.

So after a little while, they came back up. We were standing up at the top of the ladder, the stairs leading up to the flight deck. When they came back, an Air Force colonel came with them. In his hand he had a sheaf of eight by ten papers. He looked at me, because the aircraft commander said, this is the medical crew director, and he said, your mission is to take 300 people out of Saigon. He said, this is your manifest. And he said, about 250 of them are children under the age of two. There were two nurses and three medical technicians on board the aircraft, to find out that we had all of these children, plus some adult attendants, some foreign nationals, et cetera, to take out of Saigon.

Well, we had already decided how we would put people. We were going to get them up to the troop compartment, because at least there were airline seats up there. So we went through and took out all the armrests. Then we decided how we were going to put all these children on board the aircraft. Fortunately, the flight crew was augmented, and so the flight crew that was not flying that part of the mission became members of the medical crew immediately. We gave them jobs to do.

Then we had to figure out how we were going to get all these people on the plane and off, because each one of these children were being carried in the arms of an adult, and we had to get the children on the plane and the adults off the plane in some fashion.

We figured out how to do that. We used a loadmaster at the doorway. I stood at the stairway and the flight crew lined the ladder, and the rest of the medical crew was upstairs, and we just handed these kids hand over hand, and then another loadmaster acted as the traffic director to get the folks off the aircraft.

So, so far, so good. When we ran out of room upstairs, we had to secure the rest of the children downstairs. So we took blankets and pillows and litter straps and cargo tie-down straps and secured them in little groups near the forward section of the cargo compartment of the aircraft. We put one or two adults with a group of little children, and tied them all down. We had some older children, so we tied them alongside the walls of the aircraft, because there was a little ledge they could sit on, so we put blankets and pillows there, and wrapped cargo tie-down straps around them and litter straps, and secured them to the walls of the aircraft.

At the very last minute as we were finished, the medical crew from the 141,

seeing that we were going to have our hands full and they were not going to have anything but adults on board, asked permission to augment our crew. So then we ended up with a second medical crew. I had already split my crew, and I split it again, and we had one full medical crew upstairs and one full medical crew downstairs. And we took off.

As we were climbing to altitude, we were passing through about 23,000 feet. Right before that, the woman in the cargo compartment had gotten ill, and I had gone up the ladder to obtain some medication. One of the other nurses and I had decided to give her some medication. When you are in AIREVAC and you are the nurse, the medical crew director, you make decisions that sometimes physicians make, but in certain circumstances those are the decisions you have to make, because you have no one there to refer to. So we decided to give her some medication. We had the medication kit stowed behind the loadmaster's seat upstairs.

So I was getting the medication out, and as I was shoving the medication kit back behind the loadmaster's seat, one of the loadmasters leaned over and said, do you need anything. I said no, I don't need anything. Just at that moment, the plane was rocked by a loud explosion, and we experienced a rapid decompression. The hole in the plane was big enough that we had for all intents and purposes an instantaneous equalization pressure inside the aircraft.

When the fog cleared after the RD -- and I think all of the crew, both medical and flight crew, recognized what had happened, I was kneeling on the grate. There was a grate back there by the loadmaster's seat, where you can look down into the cargo compartment. If you had looked down before the rapid decompression, what you would have seen was where all the luggage and the supplies that we had brought were stowed, plus the pressure wall, the C high density pressure wall, and beyond that the clamshell doors that closed the rear cargo compartment.

When I looked down after the fog cleared, I saw the South China Sea, dancing in the sunlight. There was no pressure wall, there were no clamshell doors, and what was left of the cargo that had been there was one medical kit that we had brought, that was seesawing like a little teeter-totter on the jagged edge of the floor of the aircraft.

When I turned around to see what was going on behind me, I saw that the ladder had been ripped out, and that one of the loadmasters evidently had come up the ladder behind me and was reaching -- there is a little gate you close as you go up, so nobody falls down the ladder. He was reaching to unlatch that at the time of the RD. So he was hanging by his hand on that gate, hanging into the void below. So a couple of the other loadmasters and I had to get him over that and onto the floor of the troop compartment.

We couldn't get back downstairs, so we had no way of knowing what was happening in the lower part of the aircraft. We couldn't get to the flight deck, because there was no access to the flight deck, because the stairs were gone. So what we had to do was decide how we were going to implement our emergency procedures, given our small area of the aircraft, and hope that those in the other parts of the aircraft were able to

function appropriately, too, and to treat anybody who had been injured.

So we went through our recently-learned procedures for using the emergency equipment and the safety equipment inside that part of the aircraft. The C-5 has slides, escape slides, so we designated someone to go out the slide, and really prepared for a crash landing from that point on, which is what we actually had then.

As we were making the return to Tan Son Nhut, the aircraft commander and the pilots, the flight crew that was flying the plane, and trying to do a damage assessment to see what was operable on the aircraft. The only thing that was operable on the aircraft were engine powers and the right aileron. That was all that was functional. Nothing else worked.

So between alternating engine power to keep the plane flying level and make a right turn to come back around to Tan Son Nhut, the pilots were able to bring the plane around and line it up for an emergency landing at Tan Son Nhut. Unfortunately, we didn't make it. When they lowered the landing gear manually, it created a lot more drag on the aircraft, and we lost a lot more altitude more quickly. We hit a dike on one side of the Saigon River and went airborne again, and then skidded through the rice paddies for about the length of a football field. As we did that, we sheared off the entire cargo compartment of the aircraft. The flight deck separated from the troop compartment, and the wings with the engines on them likewise separated, so that when we came to a complete stop, the troop compartment was much like a little quonset hut in the mud. The flight deck was upside down at a 90-degree angle from us, some hundreds of yards away from us, and the engines and the wings were on fire in another direction.

Fortunately for us when they separated, or as -- I love the way the Accident Investigation Board calls it, when they departed the aircraft -- when they departed, they departed at a great distance. So even though they were on fire, fortunately we were not in danger of any serious fire, although we did have a couple of flash fires, because we had a lot of jet fuel and debris around us.

When we came to a complete stop and were able to get out of the aircraft, we were able to step out of the aircraft from the troop compartment, which is several stories. If you have seen a C-5, it would be several stories high. We set down into the rice paddies and kind of assessed the whole situation. We actually assessed what the status was of all the children in the troop compartment.

One adult had died, and I still to this day do not know what caused that individual's death. One of the babies died because she was in the forward-facing loadmaster's seat, and the impact, even though we had tied her in and secured her, threw her out and she flew through the cabin of the aircraft. Then one of the loadmasters died in that party. He was the one who had been talking to me right before the rapid decompression, and had used a pocket knife -- because when we impacted the first time, the escape slides began to inflate inside the aircraft, and had they continued to inflate inside the aircraft, they would have crushed everybody to death in the troop compartment. So he got up and took his pocket knife out and just tore them up with the knife so they

would deflate. Just as he finished doing that to the second slide, we impacted again and he became a flying missile through the troop compartment of the aircraft.

Well, when we assessed the situation after that happened, we had to figure out what we were going to do if no one came in to get us, because we had no way of getting out of there. If you have ever walked in rice paddies, you can get anywhere from knee to waist deep in the mud, and that is where we were.

Fortunately, the helicopters came in very quickly. The 141 that had taken off behind us saw what happened and helped, in terms of getting the mayday and the information back to the command post. So the helicopters were actually looking for us practically from the time we finished our crash landing.

But they couldn't land, of course, because of the terrain. They couldn't come too close to us, because there was too much debris. So when we began to evacuate the children to take them to the helicopters, the only way we could do it was to back out of the troop compartment, walk backwards through the mud with as many kiddos as you could grab in your hands or under your arms, and any which way you could get them, some of whom protested loudly, because we had them by the seat of their pants or by their feet, and were carrying them upside down, but we wanted to take as many of them as we could at a time. We had to walk backwards until we got to the helicopter, and then when we got to the helicopter, the folks in the helicopter would tell us to turn around, and we dropped them on the floor of the helicopter, and then we would wade back through the mud to get more individuals from the accident scene.

That was tricky enough. The other part was to have to do triage as a medical crew member, to do the triage that had to be done. One of the loadmasters-- the one in fact who had been pulled up over the gate--was hanging by the gate, had taken the crutches of a little girl -- we had a little girl who had been brought on with braces. She was more like five or six, and he had taken her crutches, and he splinted his own leg, so he could get up and walk around and help with the rescue. He actually positioned himself at the door, or what was a doorway that was created by the crash, to hand the children out to us. He couldn't walk as easily, but he could stand there and hand them over to us.

He came to me and he said, you need to look at Sergeant Parker, because he is hurt really bad. He is the one who had cut the slides with his knife. When I went over to him -- I had seen him. When I went to see him, I saw him immersed in the mud. The entire top of his skull was pushed in, and his brain was oozing out around his skull. I had to say to Sergeant Perkins, I said, I know we need to take him, but we can't take him right now. Yet, as a crew member, you are torn by wanting to take care of them at that moment, because they are part of your crew, they are part of who you all are, in terms of that mission.

Eventually everyone got back to the Seventh Day Adventist Hospital in Saigon, or got rescued.

There was another crew that got alerted that day, too. There was a C-9 crew, and they were sitting at Clark. They knew that the C-5 had gone over, they knew what the

mission of the C-5 was, and they also got alerted, but they got alerted to go to Korea for another mission. As they were en route to Korea, they got diverted. Again, without being told why they were being diverted, they simply were told, you are diverted to Saigon, and you will be given your instructions when you land. So that crew was one nurse and two medical technicians, plus the aircraft commander, the copilot and the flight mechanic. So that was six people on that C-9.

When they landed and went into the command post, they were told what happened and what their mission was. The nurse and the med techs were told that they were to go into the hospital in Saigon to assess all of the survivors of the C-5 crash, to determine which ones they were to bring out that night and what was needed to be sent in the next day to bring the rest of them out.

The nurse in that case was also a lieutenant. They were, needless to say, overwhelmed by what tasks they had to do, because they had to make all of these decisions and deal with their own feelings and emotions and thoughts about the fact that they knew some of their friends were on the C-5, and not know who had survived.

The other piece of that was that all the rest of the AIREVAC kept continuing on. We had to fly all the regular missions and add on all of these missions, plus deal with everyone's emotions and feelings about losing friends and having to deal with this whole situation.

That is really a very, very brief version of the story. But I think what is important to remember is how definitely uncertain many of our missions can be, how we can often go into humanitarian missions -- and in this case, this was a State Department operation really, given to the Air Force to be carried out -- how confusing sometimes the lines of command and control often are in those situations, and how you can be faced with monumental life or death decisions without any notice, so to speak. Certainly we had been prepared at flight school, we had been taught about all of those things, but to face it in that particular environment -- I think I have given you plenty of occupational stressors that occur, plus the situational stressors, plus the traumatic stressors that occurred in that situation.

I would like to be able to say that everybody who participated in that, whether they were directly involved or whether they were other members of the squadrons that were involved, are okay today, but they are not. I know that some of my fellow flight nurses who flew with me are still trying to cope with that situation. Even though they didn't fly that mission or that particular mission, it affected them.

I later met the maintenance chief who had cleared that aircraft to fly. He said as soon as he heard the plane had crashed, he ran back to the base and he went through everything in the maintenance log, to see if somehow he had missed something that would have caused this. So the effects from these kinds of situations, even though you might be directly involved as I was as the medical crew director, they affect anyone who in any way has some relationship to either the people involved or the situation involved. Those things that you have to think of, that it affects far more than just the individuals

that are involved.

In some ways, I think those of us who were directly involved have fared better from the standpoint of dealing with the stressors than some of the people who maybe were more tangentially involved, but still part of it.

I know it is getting late, so I will quit.

DR. HOLLOWAY: I'll follow this last example as perhaps bringing up one of the real issues of this conference. That is, how do people behave according to gender under extreme circumstances, hearing about an extreme circumstance, a real disaster, and a person who lived through that disaster. You have heard something about the sequence, how confusing, and other things that are involved.

I am going to become slightly academic here, and go to a study that Lars Weisoff did. Lars Weisoff is the professor of -- I guess it is disaster psychiatry at the University of Oslo, and he operates a number of disaster rescue teams that do both medical and other kinds of rescue there. One of the studies that he did was the performance of people who were caught in a large explosion of a chemical plant and fire, the same sort of traumatic event. It was one of the few studies in which the question was asked, how well did people perform and how well did they do their jobs, and did the things they do reduce or increase those overall problems.

Let me tell you that when they first did the cut of the study, and they examined what variable most prominently related at a very slightly statistical level, you might say, the usual .05 level, to good performance or poor performance, it was gender. Women performed more poorly. Fortunately, this was not a poorly done study.

But they then went on with the next set of things, and examined, let's take other variables, training and experience with disasters, training in this case being what happened in school before. They discovered those had strong statistical relationships to the outcome, and once they examined, it turned out that the best experience for having performed well in this example was to have been on ships in the North Sea. In fact, most of the women who performed well had been on ships in the North Sea.

When women had the training and the same experiences as men, all gender differences disappeared. That is just sort of a -- like what you were talking about; it is kind of a parable, but it is also a study. The parable part of the study is that the initial conclusion could have been, say, look at this disaster and look at the poor performance. But the fact is that the critical issues were training, training and training, and previous experience in having performed well.

I wonder if the audience has some questions and discussions. Perhaps the panel members have some things they would like to say at this point.

CAPT. MARINER: I'll jump in there. I think in aviation, where we deal with this kind of situation a lot more than many people perhaps realize--not with children, with people who are have voluntarily put themselves at risk, the issues under stress when you are properly trained are issues of character. Good training makes a lot of difference, but in the end, who breaks and who stays is individual.



LT. COL. AUNE: I would like to add one thing on the training issue. When the Accident Investigation Board-- and there were two following this -- and we were a crew, a flight crew and a medical crew that had never worked together, other than that day. We had never met each other, we never knew each other. But the one comment that was a constant theme of the Investigation Board was, it was the professionalism and the training of both crews working as a team that prevented the situation from being worse as it was. As bad as it was, it could have been a lot worse, but that was a constant. It was the professionalism and the training of both the medical crew and the flight crew, working as an integrated team that prevented a worse tragedy.

DR. WOLFE: I just wanted to add to what you said. There is actually a recent study, I can't remember if it is by McCarroll or Carroll, looking at Persian Gulf War mortuary workers. It really found the same thing that you just mentioned about this other study, which is that basically, inexperienced and unprepared graves registration and mortuary workers in the Gulf War did significantly worse, and the ones who had prior experience did considerably better. That was the strongest predictor, and it had nothing to do with gender, rank or anything else.

DR. HOLLOWAY: I think character is indeed very important, but I think it is little influenced by any of the things we can do in preparation for the event. Therefore, it is extremely important to make sure that we get people the right experiences and the right training.

My concern about using character as a variable is that it is often used as the last refuge of people who wish to describe why a situation they planned poorly failed; it failed because of somebody else's character, rather than because of poor planning and poor construction. That is my concern about that particular variable.

DR. WOLFE: Even in the sexual harassment and sexual assault data, experience and support from above as well as peer support are significant. There are temperamental and dispositional differences in all of us, but there is so much more that can be done through training, experience and leadership.

When we got back the sexual assault data from the Gulf, the women had written us comments, unsolicited, and they fell almost into two piles. One said, my unit would never have tolerated such an event, or my CO wouldn't have let this happen, I don't know what you're talking about, we were like brothers and sisters. Invariably, they were the women who had no such incidents. Almost to a person, the women who had adverse experiences, if they didn't already have a previous experience like that, basically said they felt they couldn't protect themselves. Their unit either threatened to socially isolate them, because they were going to wreck the unit's commendation history, chance for a commendation, or their CO told them to put it aside and forget about it, or in some cases, someone was actually threatened with a psychiatric discharge.

CAPT. MARINER: Being in the middle, I don't disagree with either of those, because there are those things that you can control and those you can't. There are certain variables like character that you can only prepare and train to a certain degree, and then it



is under fire that it is tested.

The example that Dr. Wolfe described is what we call leadership. In those units that have strong leadership, I'll use the word traditional, because traditionally, that was the way the Navy took diverse groups of people and made them a cohesive team -- same standards, fair leadership, where respect was the issue, not being liked, and those were the kinds of places where you had the least morale problem, be it sexual harassment or misconduct or whatever.

**PARTICIPANT:** This is a comment that relates somewhat to your tradition statement. Women are there because they were replacing men that don't have a desire for volunteer service. Is it conceivable that given the economy and given what they are saying, that is too goddamn much money to deal with all this, what with Medicare problems and whatever. But the bottom line is, I don't think there is enough effort put into developing counter arguments. For example, you have the isolated studies like the one in Sweden, but I don't see much effort to really develop a good offense to offset what I anticipate, a potential backlash.

**CAPT. MARINER:** That was what I was addressing when I talked about the politicization and the culture wars. You can read the editorial pages of any number of magazines, and you can see that that is already going on, where women are portrayed as problems. People use those arguments, and exploit deaths and other issues to advance a political agenda.

My recommendation goes right back to the basic leadership issue. If you see something wrong and you do not stand up and counter it publicly right then and there, your silence amounts to tacit approval. When a political figure is maligned in an editorial page, that person will write back the next day and say I didn't do that, or this is my side of the story.

The absence of that kind of response has been deafening. We do not see our leadership doing that very often. They will do it in some forums but not in others. I have to acknowledge, it would be a fulltime occupation to answer negative editorials. You can employ a writer full time answering some of this stuff. But it would be very important, I think, to military men and women that are out there in the front lines in harm's way right now to have the leadership stand up and say, look, you guys, grow up, it is not that way, knock it off.

**PARTICIPANT:** I am saying something different, though. I think that is begging the question, hoping that that might happen. It seems to me that there probably is a great deal of information out there. If we were to consolidate it and direct it to a specific issue -- for example, let's take the question of women losing time on the job because they have to go to sick leave--and now you might find out that there aren't enough gynecologists or enough facilities or whatever to count after the fact, to try to (comments off mike) very time consuming, and it is just so hard to cover it.

**DR. HOLLOWAY:** Let me see if I can respond to your question, respond to it in this way. There already were a series of studies done in the late 1970s in the Army, in

which the question was, what stood between us and the Russians. Now, in 1976, we did not have enough people to deploy in the transition to the all-volunteer Army and the outstanding Army that we began to acquire in the 1980s. We did not have enough people that could fix our tanks. So the people who could fix our tanks, about 60 percent of them actually deployed in Germany, I would judge, during that period of time were women. So what stood between us and the great Soviet empire, that great Soviet empire, was a thin red line, and it had the XX chromosome. That was the thin red line that stood between us.

The service was already aware at that time -- the point made earlier by the Captain -- that there had been a group of people who had decided not to come in the service and that were absent from the service, and that their ranks are being filled by women. That was already evident across the line.

And to the second issue of how to state the data, I have noticed that many of the papers in this conference, -- I have been upset by this--state the question in terms of how many gynecological illnesses there are, not how many days lost there are.

Now, a previous study by Bishop compared men and women were done in terms of days lost, not days ill. That now took the number of times that men with their raging hormones expressed them by hitting each other and doing all those other clever things that we do in terms of days lost. Those injuries, when you add them up, was a wash with women's gynecological complaints. That is of course what you find in the Canadian Army and the other armies.

So what you have got to do is make sure that you state the data in terms of what is a managerially relevant term. It is the number of days that somebody is doing their job as a soldier or a sailor or an airman, not the number of days somebody sneezes.

CAPT. MARINER: Another important aspect is what I call inside and outside the Beltway. Inside the Beltway, you are dealing with political issues, and that is a whole different realm. In the real world, in the everyday world where we are dealing with integration, you are never going to overcome certain people's prejudices and biases. You can give them every fact, you can tell them the facts, and they just don't want to believe it.

So now you have to deal with the leadership aspect. Basically, you tell people like that, that can't get along with their teammates, that they are the problem and we are going to get rid of them, not get rid of women or whatever other group it is that they don't like.

DR. WOLFE: The other thing that I think you will see changing, which is changing rapidly now, is just demographics in the country, with women's increasing emergence into the work force. I think women are now 60 percent of all new business startups, or maybe even higher than that, in this country.

So as you see more women entering the business field and in the military and the civilian sector, more women being promoted to higher and higher leadership positions, I believe you will continue to see a change in the culture.

As the Captain is saying, a lot of that tone has to be set and maintained from the top. When you are doing it without those individuals represented at that level, you are in effect fighting an uphill battle. So I believe some of your battle has been fought.

DR. HOLLOWAY: Well, I think it is being fought. I want to be careful about that. It is sure not over. And I want to be careful about saying inside the Beltway and outside of the Beltway, because inside the Beltway can make a very small hole that can make you very dead, in terms of a given program.

GEN. FOOTE: I think one of the interesting things today is that we are beginning to mature, 20 years into expansion, a coterie of young executives, men and women, who have been brought through the integration process, who are on the verge of taking some of these returns. They are going to be gangbusters, not only in the officer ranks, but in the enlisted ranks, with a greatly increased number of noncommissioned officers, women, who are command sergeants major, who are major command sergeants major, or chief master petty officers or what have you, but who are going to be there to respond to much of this type of criticism.

It has taken us 20 years to grow this group. I think we are in for a day when, within the service structures themselves, the answers are going to be manifest by the leadership that responds to those who try to distort the facts in terms of gender, and really nail down what the problems are.

It has taken us a long time. But I guess one of the things that I have learned over the 30 years is that any group in control at one time, or any group of women or any minority can only hope to advance the flag 100 yards in its day, and then hope that the next generation advances it another 100 yards.

PARTICIPANT: My sense is that in terms of the final analysis, the resource and the policy in the Congress, we have seen affirmative action and backlash against blacks. When white men are feeling desperately disenfranchised, they take all these isolated facts that can be used to prove that women are having some problems. But there will be some politicians who will make decisions that will make it even desirable for women, day care and so on. It seems to me again that there is not enough effort to put together what exists to counter some of those things.

GEN. FOOTE: Well, with the Republican Congress today, it would be very hard to put together anything that would be proactive, for the military or any group that you have. That is a biased view, but I think it is also true.

CAPT. MARINER: I will say this. I am positive about this in the long run, maybe because I am an optimist. But it is getting better, so much better than it was, and it will continue to get better. There are still problems. The fact that I would even suggest that maybe women participate in a study shows how far I have come, because 20 years ago, any study was used against you.

DR. HOLLOWAY: I know that there is lots of other discussion, and some of the panel will be around afterwards. But I think we ought to give Dr. Ursano a chance to come up here, and in a well-chosen set of phrases summarize all of this. Dr. Ursano is

the professor of psychiatry here, has a long and distinguished military record that extends through so many things, I can't go through them. He is one of the world's leaders in the study of post-traumatic stress disorders of POWs, and of disaster relief. We have been liberally stealing his ideas as we have been presenting here.

DR. URSANO: Thanks, Harry. It has been a stimulating series of talks, and I will try to keep my comments very brief because of the late hour. Let me make a few comments about each of the presentations, and then a couple of summarizing comments.

Firstly, Dr. Wolfe presents to us a series of data to remind us that sexual violence against women is a prominent issue both within the military, as well as outside the military. As is always true, the military has been a community which is both a part of the larger community and apart from the larger community. Separating out those problems which are unique to us and those which are more generic to the society at large can be important in terms of understanding where to target some of our resources, but regardless of whether or not they are unique or a part of the population at large, they impact upon functioning and health within our community, and from the medical perspective, must be addressed.

One of the things not commented upon, but I'm sure Jessica would agree with greatly, is that the issues of spouse abuse are in fact prominent in our population. I would remind those of you that missed the news this weekend that there was an event of an active duty woman killed by her civilian husband. In fact, that represents the statistics in the military, that in that area, we probably have the highest rate of spouse abuse occurring. It is a unique population of vulnerability to our active duty women, in which the only people that are going to study that and try to understand it is going to be the active duty community, not our civilian counterparts.

Secondly, although there are more single parents who are men than there are single parents who are women, the percent of single parents is highest among women. It is true that single parents carry unique burdens, unique demands upon their time, and require unique resources. To forget about dealing with single parents is to forget about both the stresses of combat as well as the stresses of daily life.

Thirdly, in the area of homecoming, which Dr. Holloway has particularly written about, it is one that we need to particularly understand more as our troops return home from deployments in combat missions. Single parents may be at unique vulnerability in these areas.

Lastly, in terms of Dr. Wolfe's presentation, and a theme that I think spreads throughout all of the presentations, and I would again address to a chapter that Dr. Holloway has written, we need to consider the issues of stigmatization. Stigmatization occurs throughout medical illness, whether or not it is the stigmatization of those who are disabled, when someone says in the audience, could you please stand when you make your comments, and you forget that the person is in a wheelchair, or whether stigmatization occurs because of our wish to blame the victim, because it makes us protected.

It is important in our population, in which stigmatization can be dealt with in both punitive as well as social ways by avoidance, that we address these in a straightforward manner.

One of the ways in which we sometimes implement the process of stigmatization in organizational ways is through screening. We decide the way to address a problem is to screen out the bad apples. Let me assure you that screening from the psychiatric and physiological perspective is exceptionally ineffective. Training, however, is exceptionally effective. The only area in which screening has ever been effective is that of choosing astronauts, in which you can afford to throw out 999,000 people in order to choose one. It is not an effective mechanism for developing a fighting force.

Let me turn now to Captain Mariner's comments, which I was very pleased to hear. I would venture to say that she may well be the only line commander, certainly in the audience at the moment and perhaps in the audience all today, other than General Foote. I would be very interested to know if there were others.

It is an area in which we miss the opportunity to talk to commanders, to in fact learn their language and to be able to begin a dialogue which will in fact better aid our community and our population.

I think Captain Mariner's comments in particular remind me that we are products of our time, both as leaders as well as health care providers. Dr. Mariner was commenting about the need for leaders to understand how their troops act, that leaders must know their troops, must be sensitive to their troops, and who their troops are now, rather than who their troops were at the time they were that rank or were that age.

It is important as the generations change and the problems change that we keep track of the problems that are present at the moment, and not just those that were present 25 years ago when we were at that point in our own careers. It is an issue of generations that occurs in organizations as well as in families.

I am also reminded about the enlisted populations of the Air Force, having served a career in the Air Force myself, that they are a uniquely vulnerable population in terms of the flying community, uniquely vulnerable to a particular risk in the present world, which is that of chemical and biological warfare. Air Force bases are prime targets. They don't move like ships and they don't walk like soldiers. They are spots in which in CBW attacks are primed to occur, and it is our enlisted troops that may be most vulnerable in this setting.

What does this have to do with gender? You heard earlier some comments about, if your mask doesn't fit, it won't work. If there is not a voice to speak, will that mask fit on a female face as well as a male face, we will lose women.

If there is not a voice to say, how will women urinate, not just how will men urinate, the suits will not work. Chemical protective suits don't work when they are wet. You must be able to urinate.

Let me turn now to Dr. Sutton's comments. Dr. Sutton is a friend and colleague who was with us for some time. We are pleased to have her back. Let me underline the

comment that she made and Dr. Holloway echoed: logistics, logistics, logistics, logistics. Planning is the sine qua non of war. One must plan, recognizing who are the troops that are fighting, and who are the troops who may be injured.

Secondly, I think Dr. Sutton has elegantly illustrated the importance of the buddy relationship. All of our literature since the Korean War indicates that one of the most important protective elements against the stress of warfare is the relationship between peers that occurs in the foxhole, in the plane, on board the ship. It is because of those unique relationships, buddy to buddy, brother to brother, sister to sister and brother to sister, that many of the stresses of war can be dealt with. Understanding how that relationship develops and how it is maintained is critical to maintaining the resiliency of our troops.

Lastly, let me mention and underline Dr. Sutton's comment about culture stress. In this age in which deployment occurs rapidly to foreign nations, the issue of gender stresses as they relate across cultures can in fact be one of the most important areas to examine, and also the area of gender stresses in cross-national, international operations.

How women are treated in the Pakistani military is quite different than how are they treated in the U.S. military. If you have to relate to Pakistani officers, you need to understand how to react, how to respond, and how to deal with the experience you will have in that setting.

Lastly now, let me turn to Colonel Aune's discussion, which I found very poignant. Having worked particularly with the POWs coming back in 1973, hearing again about 1975 brought back many memories.

We had a discussion in part of our year and a half here at the university in looking at this area by Colonel McCarthy, who had retired from the Army a number of years ago. I want to quote her and attribute accurately, a course that she had taken when Walter Reed offered a nursing school, which was called Nursing Arts 103. The title was, How To Make Do.

Much of the question of how to deal in any stressful environment is how to deal with limited resources. It is training that allows one to do that. As Dr. Holloway commented, it is probably training that is the most important element in protecting against stressors.

It is the experience of terror that Colonel Aune describes that we must learn more about, and how that can be differently experienced both biologically as well as psychologically.

Lastly is the difficulty of decision making when one must triage and leave behind friends who may die and colleagues who may not come back with you. Those are difficult decisions in all settings in which supervisors must operate, and particularly in the setting of combat.

So to summarize. Let me say firstly, let's remember as we do science that statistically significant does not necessarily mean meaningfully different. Because two things are statistically different, it may have little impact in the environment in which the



question is performance and function, in contrast to statistical difference. We need to remember that when we look at our scientific data.

Secondly, my daughter and wife frequently remind me, don't forget that you are probably shorter than most women. So when you look at the distribution curves in terms of height, I will fall in the curve with women, not with the curve of men.

I remind you of that, to remember that when we try and separate groups, groups always overlap. So the idea that one is talking about women versus men or perhaps short versus tall or heavy versus light may in fact be critical to remember when you try and implement policy, in contrast to try and do science.

Understanding health risk behaviors such as smoking and alcohol may be much more important than understanding disease itself. What tools do we have to use? We have the usual tools in all organizations. We have advocacy, we have science, we have education, we have consultation, we have policy, we have politics and we have law. That is all the avenues by which we in fact change behaviors. I believe we make use of all of those, whether or not you operate in a university or in the military or in society.

So what is it we have to do? Well, I assume that this conference will come up with a number of things, but let me list at least four.

First, we need to assure that there is voice, a voice that says, don't forget the hygiene products. If there is not voice, ideas and items will be forgotten. Voice can be assured by assuring representation, and it can be assured by giving people the opportunity to speak.

Secondly, let me say that we have to assure volume. It doesn't only help to speak; sometimes you have to speak loudly, particularly in the area of stigmatization. When in fact the victim is being blamed, both the victim and those around him must be able to stand up and say that is not correct.

Thirdly, we always need new information, and that is the role of science, to generate new information and to be able -- lastly, number four, to translate those into a language that can be used by the line community in the line and medical exchange to further develop areas of policy and implementation that aid us in addressing the issues of female and women's health.



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## TABLE OF CONTENTS

### **Obstetric and Gynecologic Issues in Military Environments**

	<u>Page</u>
Epidemiologic Overview of Common Gynecological Disorders and First Trimester Complications Among Active Duty Women LTC(P) Carla Hawley-Bowland	67
Contraceptive Needs, Complications and New Directions for Research LTC Dan Gehlbach	70
Dysfunctional Uterine Bleeding in Active Duty Women; Scope of the Problem and Management Options LCDR Nancy Petit	74
Vaginitis in Active Duty Women; Diagnosis and Options for Treatment in a Limited Resource Environment Dr. Daniel V. Landers	78
Impact of Pregnancy and Pregnancy Complications During Deployment: The Role of Pregnancy Screening COL Cesar Rosa	84
Reproductive Hazards: Military Policy Implications CDR Gregory Moore	87

## **Women and Family Issues**

	<u>Page</u>
Background Demographic and Epidemiologic Data on Military Women as Wives and Mothers Christine Wahl	90
Personal Experience with Policy Around Family Issues MAJ Beth Davis	93
Healthy People 2000 - The Perspective From Health Affairs COL Doris Browne	95
Constructive Advocacy Carolyn Becraft	99

## **Diet, Fitness, & Performance**

Chronic Dieting in Active Women: What are the Health Consequences? Dr. Melinda Manore	109
Perspectives on Nutritional Issues of Military Women LTC Nancy King	114
Nutrition and Health in Military Women: A Lifelong Issue Dr. Bernadette Marriott	118
Exercise, Conditioning, & Fitness As It Relates to Injury in Active Duty Women CDR Joseph Moore	124

## **Epidemiologic Overview of Common Gynecological Disorders and First Trimester Complications Among Active Duty Women**

LTC(P) HAWLEY-BOWLAND

I want to present an overview of the common issues that have faced women in the military both in the field and in deployed status, and go over some of the issues that have been brought up in the Defense Women's Health Monies Program. We established a data base and we put aside money to collect data on women in the military while they were in the field and deployed. We did this so that we could better serve our women and develop policies that would maximize their performance in those environments.

The specific issues which were addressed included menstrual periods and sanitation and contraception in the field and during deployment. How do women deal with menstruation in the field? In the past women used to have to take one duffel bag full of gear and one duffel bag worth of tampons and pads to survive six months in the field because you couldn't get these supplies over there. We finally modified the sundry packs and have a female augmentation pack that carries those items.

Specific issues considered in constituting the sundry packs were the need for ample numbers of regular and super unscented tampons, with cardboard rather than plastic applicators. Good hygiene is facilitated by the availability of extra underwear and of wet wipes which are especially important when showers are not readily available.

Options to get rid of periods when deployed are also available. One is to go on continuous birth control pills. Long term use of continuous regimens has not been studied.

Depo-provera is another option. However, it can be a problem getting the medication and maintenance of the shot schedule in the field. The new technology of endometrial ablation might also be an option for women who are through with their fertility and want to have no more periods.

For birth control, one of the main issues for oral contraceptives is to take enough when deploying. For six months deployed, you need six-and-a-half cycles. So, you need to give them seven. Then you need to give them two extra, because has anyone ever heard of a deployment starting on time or ending on time? If they are on a continuous therapy, they need 8.6 cycles. Thus an adequate supply for a deployment would be 11 packs of pills.

For depo-provera, again, getting the medication in the field and getting it at the proper time is a problem. One possibility is to dispense the depo-provera injectable and the maintenance schedule with the patient when she goes to the field. Then she can have the medic in her battle aid station give her the medication at the proper time.

Norplant is another form of birth control that is available and easy. It is good for five years with no required maintenance. Irregular and sometimes almost constant bleeding is a not uncommon side-effect, especially at first and some women aren't willing

to put up with that. We are also considering looking at a new site for insertion, maybe placing it over the rib cage in active duty women. The inner arm is right where the BDU sleeve hits when you roll it up.

Some of the problems of active duty women in deployment are related to the fact the equipment which is designed for men may not be suitable or ideal for use by women. Gary Davis, when he was at Fort Rucker, noticed an increased incidence of stress incontinence in active duty soldiers who had never been pregnant. On physical exam, he found lateral wall defects. This was a result of women jumping out of airplanes and landing on their feet and actually tearing the lateral support of the pelvic wall. We need to look at whether the services should redesign the harness for the parachute so that the soldier lands in a different position and the forces are in a different direction and won't detach the lateral vaginal walls.

Orthopedic disorders differ between men and women. Men injure their knees all the time. Women injure their ankles more often. One factor in this might be the design of boots for females, which are basically male boots in female sizes. A redesign, perhaps making them like running shoes with the specific dimensions of a woman's foot, might alleviate some of the ankle problems. Heel pain and achilles tendinitis are also fairly common in women who wear high heels.

Vaginitis is increased with tight pants. The battle dress uniform that all the army soldiers wear has a short crotch. Therefore women should be encouraged to buy the loose, baggy fit in order to decrease the risk of vaginitis. (Specific issues in self-diagnosis and treatment for vaginitis are covered below in Dr Landers talk.)

Shoulders in females are also vulnerable when using standard load bearing equipment which is meant to carry weight on the shoulders. Women are more comfortable when carrying their weight on the hips. Redesign of this equipment would facilitate load carrying by female soldiers.

Cockpits are designed for the 5'10" male. Women can't reach the buttons or the pedals without back strain. A redesign to create a universal cockpit that both genders could use comfortably might solve this problem.

There is no privacy for urination in the middle of the desert and in many other areas of deployment. If women "hold it", they get bladder distension and an increased risk of bladder infections. Also, if they undergo blunt trauma, there is an increased risk of rupture of the bladder because it is distended.

Women will also undergo intentional dehydration, by purposefully not drinking fluids, because if they don't drink they don't have to urinate and they you don't have to worry about privacy. We have been successful in testing a device to address this issue.

At Fort Bliss in one field exercise we have 30,000 troops roving all over the desert in New Mexico.

In one such deployment we had a woman who got dehydrated and required IV hydration in the field, three urinary tract infections, and one woman who needed to be catheterized after voluntary urinary retention, because then she got so over-distended she couldn't go.

So, we decided to look at female urinary diversion devices that allow urination through a trouser fly. There is no need to remove clothing or gear. They were first developed by female back packers. We did a prospective cross-over clinical trial of two devices that the soldiers both used and then compared, the Freshette Complete System and the Lady J. We enrolled volunteers and did a urine culture prior to deployment and eliminated all those with UTIs. Then we issued them their first urinary device. Halfway through the exercise they underwent an interview. We got a second urine sample, completed a questionnaire, and then issued the second device for them to try. At the conclusion of the exercise, we got a third sample and completed the second questionnaire. We also had controls, who had an initial urine culture and another culture, one week later.

We enrolled 53 women and ended up with 35 testing the devices. The preferred device was the Freshette, because it had a longer spout. When we looked at results, one control did get a urinary tract infection. None of the field testers had urinary tract infections. Two controls had to undergo IV hydration for dehydration. No field tester underwent IV hydration.

Finally, for deployment we need to make arrangements to maintain the health of our active duty female soldiers. Health maintenance appointments, such as PAP smears and mammograms should be done early rather than late if women are being deployed. Thus even if it is not quite a year, if they are going to be deployed, they need to go ahead and get it, because they may be gone for six months. If a PAP smear is abnormal, instead of repeating it, it is better to do colposcopy right off the bat, see if it is abnormal, get it treated and taken care of before they deploy.

Based on our experience in Desert Storm, one thing to possibly add to equipment in theater is a colposcope. If they had one colposcope in theater, they wouldn't have had to airvac literally tens and twenties of patients back to Germany who had to undergo colposcopy for follow up.

## **Contraceptive Needs, Complications and New Directions for Research**

LTC GEHLBACH

It is really a curious testimony to our society's degree of sophistication that now, in the 1990s, we take contraception so much for granted. Those of us who are young enough to need birth control have never really known a time when a variety of contraceptives weren't available.

The birth control pill has been around longer than most of us have been alive. Condoms are much more widely available now than they were before, and a female condom has been on the market now for several years. The diaphragm is alive and well, and has been joined by the vaginal sponge as an over-the-counter alternative. The IUD, which almost disappeared following the Dalkon Shield debacle, has experienced a resurgence, and its length of usage has recently been extended now to 10 years. There are new delivery systems for progestational agents; Depo-provera, given as a single injection every three months, and norplant, the set of silastic implants that are inserted beneath the skin of the arm. Both of these agents are as effective as a tubal-ligation procedure. Given that we now enjoy so many choices, it would be easy to believe that all pregnancies in the United States are well thought out in advance, meticulously planned, and conceived at the opportune time.

The sad truth remains, however, that the majority of pregnancies in the United States are still unintended.

More than 50 out of every 100 pregnancies are unplanned. Worse, many of these are unwanted, as reflected by our high abortion rates. The limited data available for military women suggests that we are no better than our civilian counterparts at preventing unwanted pregnancies.

It is really not very hard to write the specifications for an ideal contraception. It should work every time. It should be easy for everyone to use, because almost everyone will need it at some time in their life. Nor should it be unpleasant or uncomfortable to use. Cost is always a consideration when talking about health care. Durability is also a consideration for the military. Our profession demands that we be able to pick up and go at a moment's notice to some pretty darned inhospitable parts of this planet. With an eye to the future, we don't want to sacrifice our health by using a contraceptive with long-active adverse metabolic effects. Although we have many choices of contraceptives, we don't have one yet that can meet our specifications for the ideal. All methods have their own set of limitations and no one choice is right for everyone.

One of the primary reasons a contraceptive method fails is because of an associated side effect. Our bodies are all uniquely different from one another. While a chemical agent may pass easily through one of us, it may cause extensive damage in someone else. For example, oral contraceptives that have a high estrogen content can be tolerated by 999 women, but in the next one cause venous thrombosis, pulmonary



embolism and death. People also differ from one another in our ability to tolerate certain physical discomforts. While breakthrough bleeding may be only a minor nuisance to some women starting a new birth control pill, the same degree of vaginal bleeding may be completely unacceptable to another.

Side effects are usually the primary reason given for stopping a form of contraception. In addition to the risk for pregnancy when a woman doesn't use a method as intended because of side-effects, side effects that prompt a woman to seek medical attention increase our health care costs and add further stress upon our already overburdened system.

A certain contraceptive may work well in one situation, but fail miserably in another. For example, birth control pills, a method which requires daily requirements, would not be my first recommendation for a woman who is sexually active on an infrequent basis. Nor would condoms be a good, long-term contraceptive for a pair of young newlyweds. A woman's work schedule also can cause problems. The ability to take a birth control pill daily without fail is made easier when it is linked to some daily ritual, such as preparing for bed or brushing your teeth. Irregular work hours, overnight assignments as duty officer or on guard patrol, time spent in the field or on temporary duty, all can interrupt our normal daily rituals and make it harder to be compliant.

Using a method effectively requires a thorough knowledge of how it works and also when it doesn't work.

This is an area where we health professionals are at fault. Our high volume health care delivery system precludes the time that we should be spending educating our patients about their method of birth control. Women need to know common mistakes that can cause the system to fail and what to do when a back up system is needed. No matter how good a contraceptive you have, it won't work if you don't use it. Two groups in particular are less apt to use contraception, situated at the extremes of reproductive life. The woman approaching menopause may discontinue contraception because she perceives her chances of becoming pregnant to be very low. Although she is not 100 percent accurate, in general her fertility is decreased. On the other hand, one of the most fertile groups, that of women under age 20, who probably need effective contraception the most, are also the ones least likely to use it.

The Persian Gulf conflict revealed a number of weaknesses in our strategy for providing effective contraception to our service members. One study reported a crude pregnancy rate of 2.3 percent, which was calculated by reviewing the sick call records over a six month period of five medical units that were supporting an armored division. Recognizing the limitations of such a retrospective chart review, this nonetheless suggests to me that the annual contraceptive failure rate during Desert Storm may easily have been in the range of five to ten percent, a number that is clearly too high.

Our policy in that conflict was to immediately evacuate out of theater any service member who was found to be pregnant, which turned out to be a significant expenditure of resources. The number one reason for evacuating women was for the diagnosis of

pregnancy. This accounted for more than the evacuations of women for all other reasons combined. Let me say that again, because I want this point to be crystal clear. The single greatest threat to our women troops during Desert Storm was not land mines, chemical weapons, exotic diseases or even SCUD missiles. It was pregnancy, something that we can prevent. Not only did pregnancy keep our evacuation system busy, it also tied up our field hospitals. Complications of pregnancy such as vaginal bleeding, spontaneous abortion, even ectopic pregnancy, which remains one of the leading causes of maternal mortality, all of these were seen and treated in the field during Desert Storm. Effective contraception would virtually eliminate this source of hospital admissions. Fear of pregnancy was apparently a common concern among our troops, because it was the most common gynecological complaint heard at sick call, outstripping such common disorders as vaginitis or menstrual irregularity.

Our system for dispensing contraception for deployment should also be revamped. Many women on oral contraceptives didn't have an adequate supply for their tour of duty. Others were told not to bring them overseas because, unbelievably, they wouldn't be needed. I don't know what they were thinking when they said that. Few brands of birth control pills were available and a number of women had to change brands while they were in the theater. Nor was there any formal system for dispensing condoms, the form of birth control that is also best at reducing the risk of sexually transmitted diseases.

Where do we go from here? Do we throw our hands up in defeat, or do we throw fists full of dollars into research looking for the new ideal contraceptive? Actually, I vote for neither course of action. We will probably never find the ideal contraceptive. First, as we regroup after the discomforts of down sizing, we need to ensure that all service members have ready access to family planning services. Many small military clinics have closed and our troops must go elsewhere to receive their gyn care. This is one area where relatively small sums of money spent on pregnancy prevention will save the much larger expenditures required to care for these unintended pregnancies. To take that thought one step further, let's work with our troops even before they enter our system to make sure that they are not going to start their career with an unplanned pregnancy. Remembering that this is the age group at greatest risk for an unintended pregnancy, we may easily get the best return on our health care dollars through active intervention, rather than waiting passively for these soldiers and sailors to access the medical system.

Different forms of contraception should be uniformly available throughout the uniformed services, especially some of the newer methods, such as norplant or depo-provera. Right now, access to norplant depends largely on where you live, because many clinics don't offer it due to its relatively high start-up cost. Instead, we, as health care planners, should decide which systems are appropriate and under what circumstances they should be used, and then make these services available to all service members, no matter where they are stationed. We should also educate our patients on what to do when a condom breaks, when a diaphragm slips, or when unprotected intercourse occurs. Post-coital contraception is one of the best-kept medical secrets. Even many health care

providers are unfamiliar with the various methods or how to administer them.

One problem that should be addressed immediately is the contraceptive needs for deployment. We do a good job at vaccinating our troops, helping them fill out wills, arranging family assistance, briefing them about the environmental, geographical, tactical, cultural aspects of their upcoming assignment. I would also include a visit to a health care provider to review their current method of birth control and discuss alternatives. Will it be easy to use in the deployed situation? Are there side effects that will be hard to treat in the field? What about the risk of capture and sexual assault?

Such an encounter would also give us the opportunity to diagnose an early, unknown pregnancy, should one exist, before we send a soldier or sailor halfway around the globe.

If the woman wants to start a new contraceptive method, we ought to give her time to institute that change.

During deployment, birth control should be more widely available than it has been previously. Condoms should be easily accessible to both men and women. Those women on oral contraceptives ought to be able to carry their own six or twelve-month supply, rather than tying up precious sick call time for routine pill refills. Depo-provera, the single injection that gives protection against pregnancy for a minimum of three months, ought to be there with our troops at the field hospital for those who desire it.

There is also a tremendous need for contraceptive research in the military. Although, personally, I am skeptical about finding the ideal contraceptive, the military has a rich history of significant research discoveries. Our population presents unique study opportunities that are unmatched in the civilian world.

We need to ensure that our existing contraceptives can withstand the extremes of environment and conditions that our troops are forced to endure. We should seek out new and innovative ways of administering hormonal medications that will provide effective contraception while reducing or eliminating vaginal bleeding. Finally, perhaps the best way to institute these improvements in a coordinated, logical fashion is through the development of a coherent policy that meets the contraceptive needs of our troops today and anticipates the changes necessary to keep the fighting strength what it is today, second to none.

## **Dysfunctional Uterine Bleeding in Active Duty Women; Scope of the Problem and Management Options**

LCDR PETIT

Information pertaining to our most recent military conflict confirms the presence of more than 35,000 women deployed to the Middle East in support of Operation Desert Storm. These women were exposed to the desert environment and field sanitation for four to six months at a time. Captain Jeff Hines, while serving as a battalion surgeon for the First Cavalry Division in southern Iraq, reviewed information for more than 10,000 ambulatory medical visits. While women made up for more than a total of six percent of the division's strength, they accounted for more than 18 percent of all sick call visits. Twenty-five percent of all these complaints were gyn related, dysfunctional uterine bleeding being the most common.

Major Glen Markinson reviewed all medical cases referred to the Eighth Evacuation Hospital, and found that 25 percent of all outpatient visits were from women. Nearly one fifth were gyn in nature. A fair number of these pertained to menstrual irregularity, with a greater percentage coming from women on no hormonal contraceptions than from those that were taking oral contraceptives. Lastly, Colonel John Hanna, while assigned to the 312th evacuation hospital in Saudi Arabia, reviewed the outpatient visits of 10,000 women assigned to the Seventh Corps. Five percent of all sick call visits were gyn in nature, with abnormal bleeding being a second most common complaint.

What defines abnormal bleeding? Menses normally occur between 24 to 28 days with approximately four to six days of flow. One menses typically accounts for approximately 30 ccs of blood loss. Whereas the post-ovulatory or luteal phase remains fairly constant, it is the variation in the length of the follicular phase which accounts for the variability in cycle length. Normal menses are cyclic and predictable, since changes involving the endometrium occur almost simultaneously in all segments of the endometrial cavity. The endometrium is structurally stable, with random breakdown of tissue being a very rare event. Normal menses are precipitated by rhythmic vasoconstriction affecting all segments of the endometrium.

Dysfunctional bleeding, on the other hand, is defined as abnormal endometrial shedding that is not attributed to organic disease, either in the pelvis or to pregnancy. Categories of dysfunctional uterine bleeding include oligomenorrhea, which is infrequent uterine bleeding at unpredictable times typically with intervals more than 35 days apart. Polymenorrhea is the occurrence periods more frequently than 21 days apart. Hypermenorrhea refers to excessive bleeding of normal duration, generally defined as loss of more than 80 ccs per cycle. Metrorrhagia is excessive flow for more than seven days, but normal, regular intervals between periods. Menorrhagia is irregular menstrual intervals with both excessive flow and duration, and there is generally no definable cycle.

It is important to realize that as we evaluate the active duty female for abnormal bleeding, the cause may in fact not be restricted to a hormonal imbalance. Causes of abnormal bleeding include pregnancy-associated condition, pelvic pathology, hormonal effects, and systemic disease.

As Dr. Gehlbach mentioned earlier, pregnancy was the most common cause for evacuation of our active duty women out of the combat arena. Potential etiologies of bleeding associated with pregnancy include ectopic pregnancies, abnormalities within an intrauterine pregnancy, either threatened, complete or incomplete abortions, and lastly, gestational trophoblastic neoplasia.

Pathologic conditions of pelvic organs which can account for abnormal bleeding include benign conditions inside the uterus including polyps and myomas, conditions such as endometriosis or adenomyosis, pre-invasive disease of the cervix, endometrial over-thickening or hyperplasia, as well as endometrial cancer, and other reproductive tract malignancies, including ovarian, fallopian tube, uterine and vaginal cancers. In particular, functional and neoplastic ovarian tumors by secreting estrogen androgen or HCG, can cause abnormal bleeding.

Pelvic inflammatory disease has been associated with abnormal bleeding, as have endometritis, vaginal lesions, uterine scar tissue or synechiae, and the use of an IUD.

Hormonal irregularities can involve any of the sites along the hypothalamic-pituitary-ovarian axis. Malnutrition and excessive exercises may be associated with decreased CNS secretion of GnRH. Abnormalities in the pituitary gland include direct damage to the pituitary as well as the presence of a prolactinoma or other pituitary tumor. An overactive or an underactive thyroid can cause abnormal bleeding, as can an overactive adrenal gland or congenital adrenal hyperplasia. The ovary can cause abnormal bleeding because of abnormal hormone production, such as is seen in PCO. Administration of exogenous hormones, including HRT and oral contraceptives, can also cause abnormal bleeding.

Abnormal bleeding can be associated with systemic disease, including both liver and kidney disease, blood dyscrasias such as thrombocytopenic purpura, platelet abnormalities and Von Willebrand's disease. Obesity has also been associated with abnormal bleeding. Lastly, certain medications including morphine sulfate, reserpine, phenothiazines, MAO inhibitors and anticholinergics are also associated with abnormal bleeding.

How do we begin to sort out the problem? Initiating an evaluation based on a patient's age is many times a good place to begin. In the first category of women who are less than 35 years of age the most likely cause is from some type of ovulatory dysfunction. A woman older than 35 has an increased likelihood of pelvic pathology or systemic disease, and it is recommended that uterine sampling be done, to rule out malignant or pre-malignant lesion.

Any woman who presents with abnormal bleeding should undergo a basic work up, to include a good problem-oriented history, a general physical examination and pelvic

examination, a PAP smear and a pregnancy test. An endometrial biopsy is strongly recommended if endometrial pathology is strongly suspected based on a patient's history, as well as if she is over the age of 35.

Additional studies which may be helpful include assessment for endocrine abnormalities including a serum prolactin level and a thyroid stimulating hormone, for blood dysplasias, which include a platelet count, a PTT and a bleeding time, and an assessment for liver disease including an AST or an ALT. Additional examinations for pelvic pathology might be indicated to include a transvaginal ultrasound, hysteroscopy or D&C, or even a diagnostic laparoscopy.

Management of dysfunctional uterine bleeding again goes back to age-related concerns. For example the young active duty recruit, who is exposed to strenuous lifestyle alterations, including significant changes in diet and exercise is more likely to suffer from anovulatory bleeding. In the absence of an appropriate clinical response to hormonal therapy, a coagulation disorder, such as Van Willebrand's disease should be ruled out.

The active duty woman, in her peak reproductive years, will commonly have one to two anovulatory cycles per year, and typically there is no need for a full work up after a single episode of dysfunctional bleeding. If there are more than two irregular cycles, I will typically begin a full assessment at that time.

More senior women may also present with bleeding, either in the perimenopausal period or post-menopausal period. Classically, the perimenopause is associated with either estrogen withdrawal or breakthrough bleeding, most often because of hormonal related problems. In the post-menopausal period, although hormonal problems may be of a concern, you need to realize that 20 percent of these patients will also have a pre-malignant lesion or cancer. It is important to know that both use of hormone replacement therapy and serious pelvic pathology can co-exist.

The choice of appropriate therapy obviously depends on the specific diagnosis as well as the patient's age, reproductive desires and status, and other logistic factors. Progestin therapy is an ideal treatment for anovulatory bleeding. It stabilizes the endometrium and allows for orderly, limited and synchronous withdrawal bleeding. Some of the medications most commonly used to treat anovulatory bleeding include provera, 10 mg tablets, one a day for 10 days out of each month. Progesterone in oil can also be used with a dose of 50 to 100 milligrams by injection every four weeks. And finally, depo-provera, which Dr. Gehlbach mentioned earlier as a contraceptive agent, can also be used to control irregular bleeding, giving an injection every one to three months. Oral contraceptives can also be used successfully to treat dysfunctional uterine bleeding. Most commonly, the low dose combination monophasic preparations are recommended. This is ideal for anovulatory bleeding when contraception is also desired. Depending upon how much the patient is actually bleeding at the time, one may start with one tablet a day or twice a day for up to seven days. Patients should be told that up to 60 percent of them will in fact have a heavy flow two to four days after stopping therapy. If the



problems with abnormal bleeding has been chronic, we generally recommend a three-month trial of this medication for success. Estrogen therapy is also highly used in treatment of abnormal and dysfunctional uterine bleeding. It is ideal for estrogen breakthrough bleeding that is commonly found with anovulation, as well as progesterone breakthrough bleeding, which you find with depo-provera and norplant use.

In cases of severe acute bleeding, typically we will admit these patients to the hospital and administer premarin intravenously, 25 milligrams, every four hours until the bleeding has stopped. If an oral regimen is preferred, premarin, 1.25 milligrams, or estrace, 2 milligrams may be given every four hours for roughly 24 hours, followed by one a day every day for 10 days. If the patient presents with less or non-acute bleeding, therapy can begin with lower doses of premerin on a daily basis for seven to 10 days.

Prostaglandin synthesis inhibitors also have been used very successfully to treat dysfunctional uterine bleeding. They have been shown to decrease prostaglandin E-2 and prostaglandin F-2 alpha concentrations. They also alter the balance between flavoxin A-2 and the anti-aggregating basodilation prostaglandin known as PGI-2. They have shown to decrease excessive bleeding on the order of 40 to 50 percent. They have also been shown to be effective with IUD-associated bleeding. A progesterone containing IUD can also be used in those women who have very heavy periods. By delivering progesterone directly to the endometrium, it has been shown to decrease menstrual flow on the order of 96 percent within 12 months.

Other medications that may be more difficult to find in your Medac, but available in any tertiary care center, include GNRH agonists, such as leuprolide acetate, which are typically used in a dose of 3.75 mg per month by injection. This therapy essentially causes a chemical and reversible menopause. If, in fact, you are looking for short term relief, it is ideal to be used for a period of three to six months. If you decide that long-term therapy is indicated, we generally recommend after at least three to six months, the addition of continuous hormone replacement therapy, using daily low dose estrogen and progesterone.

Endometrial ablation, essentially burning or cauterizing the endometrial lining, has also been very successful. Up to 90 percent of patients will note some improvement after the ablation is done, 50 percent of which will have complete cessation of menses. Generally, the success rates are better if a patient is primed with medication, either in the form of a high dose progestin, a GNRH agonist or denazol, to essentially try to atrophy the uterine lining before attempting the ablation. Then, as a last resort, hysterectomy may be necessary if the problem does not respond to any other therapeutic modality, and the patient desires a permanent solution and fertility is no longer an issue.

In summary, we quickly explored the variety of etiologies associated with abnormal bleeding. After you eliminate both pelvic and systemic pathology, the causes of dysfunctional uterine bleeding have been outlined, and we have broken them down by age category. Current therapeutic modalities based on specific hormonal deficiencies have been outlined.



**Vaginitis in Active Duty Women:  
Diagnosis and Options for Treatment in a Limited  
Resource Environment**

DR. LANDERS

I added cervicitis to the title of vaginitis because frequently it is difficult to assign an anatomic site to the problem based on symptoms alone. Vaginal discharges, in fact, are the chief complaint of women who have symptoms of cervicitis as well as vaginitis. So, I did want to include that in the diagnostic algorithm or decision making process that we go through when we hear about women with vaginal discharge and vaginal complaints. The lower genital tract infections in women account for over 12 million visits by women to health care providers in the United States. This, of course, drastically underestimates that number, since many of these infections are asymptomatic, and many others are now self treated with over-the-counter medications. At present self-medication consists of primarily yeast preparations, but there is an attempt to make other over-the-counter medications for vaginal symptoms available in the future.

The prevalence of these infections is highest in the 17 to 25-year-old age group. This is especially true for the sexually transmitted organisms, which account for a large percentage of these infections. The relevance of these infections to military women can be summarized in the following statistics.

In a survey of army personnel, one in five women reported at least one STD in a two-year period. In another study that was published by Malone and co-workers, over 1,700 military men deployed aboard ship for six months to South America, West Africa and the Mediterranean were surveyed. Forty-nine percent reported prior contact with a commercial sex worker. Twenty-two percent reported a prior STD. Then, during the subsequent six-month deployment, 42 percent reported contact with a commercial sex worker, 10 percent acquired a new sexually transmitted disease, and 10 percent reported having sex without a condom.

This is a concern because there are other studies that have shown that military women are mostly likely to meet and choose their partners from among military personnel.

There is some recent evidence that has emerged that cigarette smoking as an independent -- that is, even in a multivariant analysis -- an independent risk factor for the acquisition of a number of STDs. It has particularly been shown for chlamydia, gonorrhea and PID. The initial thought of mine is that people who smoke are more likely probably to drink and be in bars, et cetera, et cetera. But apparently these things were all controlled for in the studies, and that cigarettes were an independent risk factor. This is a concern in that statistics have shown that 31 percent of women on active duty in the U.S. army smoke cigarettes. It is also well known that delay in diagnosis and treatment of

cervicitis and vaginitis can lead to some serious sequelae, including ectopic pregnancy and subsequent chronic pelvic pain and infertility.

So, what are the culprit organisms? I have a colleague, Dr. Sharon Hilliard, who has spent most of her life as a vaginal microbiologist, if there is such a thing. She has worked with me on this enterprise. Infections in the lower genital tract include vaginitis and vaginosis each with involving different organisms.

*Trichomonas vaginalis* and *candida albicans* can both cause vaginitis. That is, there is an infiltration of white cells into the genital tract. You can usually find polys associated with these. Vaginosis, on the other hand, lacks this sign of inflammation. That is probably the major distinction between the two. The term "bacterial vaginosis" has been fiddled with over the years, at one time being referred to as "non-specific vaginitis" because it wasn't yeast and it wasn't trichomonos.

Later an organism which was frequently present during these infections was renamed and the condition was named for it "gardnerella vaginitis". They sooner or later realized that it wasn't the gardnerella that was causing the infections, but that gardnerella was present frequently at the site as sort of a marker. In fact, the infection was caused by large concentrations of anaerobes in the genital tract. So, they named it anaerobic vaginitis. Since there were no white cells associated with this condition, they decided that it should be called vaginosis. Since it wasn't just anaerobes, but aerobes and anaerobes, they changed the name to bacterial vaginosis. So, all of those names really pertain to the same condition. Sharon suggests that it really needs to undergo one more change. It needs to be called vaginal bacteriosis, because the way it stands now, bacterial vaginosis means too many vaginas for the bacteria. In any case, cervicitis, which will also masquerade as a vaginal discharge, is primarily caused by gonorrhea and chlamydia. But I think all of us that have been involved in women's health care realize that these organisms are not isolated in all cases of cervicitis. There is certainly an other category of people who have mucopurulent cervicitis and it is caused by other conditions. Whether this is in association with organisms like bacterial vaginosis, we really don't know.

If you don't have gonorrhea and you don't have chlamydia, it doesn't necessarily mean that you don't have cervicitis, which by definition is more than a certain number of white cells in the cervical canal. *Trichomonas vaginalis* is a multi-protozoan, as you know. It is sexually transmitted. About three million infections per year in the United States. It accounts for about 15 percent of infectious vaginitis. It has also been recently shown to enhance the risk of HIV acquisition.

There has been a lot of work done lately on STDs and the risk of HIV, both in terms of acquisition and in terms of transmission. If you are HIV infected, some of the STDs will upregulate the amount of viral expression and increase the likelihood of transmitting, as well as, if you are not HIV infected, the organisms can upregulate virus that you are exposed to and increase your risk of acquisition. Originally that was found to be true of the ulcerative STDs, like syphilis and chancroid. The theory was that the ulcer provided an additional portal of entry. Now it has been found to also be true of the

non-ulcerative STDs such as chlamydia, gonorrhea, trichomonas, and it is thought to have a different mechanism. One possibility is that activation of cytokine pathways can result in upregulation of HIV expression.

Yeast vaginitis is not generally thought of to be a sexually transmitted disease, although there is certainly transmission of candida species. Seventy-five percent of women have at least one episode at some time in their life. It is often symptomatic. It is unusual to have a significant yeast infection and not have any pruritus. It has also been reported that yeast vaginitis, for uncertain reasons, enhances the risk of HIV acquisition.

Bacterial vaginosis is the most common cause of infectious vaginitis or vaginosis. It constitutes about 45 to 50 percent of cases. In bacterial vaginosis there is a shift of the microflora to a predominantly anaerobic population. In the normal vaginal environment there are large numbers of lacto-bacilli that ferment lactic acid which keep the pH of the vagina very low, usually below 4.5. It is very characteristic that these lactobacilli produce peroxide. Dr. Hillyard and others have found that peroxide producing lactobacilli are virtually always present in a healthy vaginal ecosystem and they are virtually never present in bacterial vaginosis. It seems that the lactobacilli in this way also provide an immune defense in the lower genital tract.

So in bacterial vaginosis there is an increased pH, greater than 4.5, and amine production which occurs from the metabolism of anaerobes -- amines like putricine and cadaverine, trimethylamine -- those are those foul smelling or fishy smelling amines that get released when you put KOH on the slide in vaginosis. Of note HIV does not transmit as well at low pH. So, as the pH of the vagina is raised with bacterial vaginosis, the environment is more conducive to HIV acquisition.

Chlamydia trichomatous is an obligate intracellular organism which causes about four million infections per year in the United States, very often asymptomatic. There are studies that actually show, while chlamydia infections as opposed to gynecococcal infections, tend to be more asymptomatic, they also tend to be associated with more inflammation, which is probably why they are more associated with infertility and tubal damage. In some studies chlamydia infection has been shown to be associated with significantly higher erythrocyte sedimentation rates, C-reactive proteins and other non-specific measures of inflammation. Also, chlamydia enhances the rate of HIV acquisition.

In my lab we have recently been able to demonstrate that if chlamydia is added to, a cell line replicating with HIV, and it will dramatically enhance the amount of HIV that is being replicated. So, there is a direct effect on the organism. The other thing that we and others have done is separate out PMNs from peripheral blood and put these PMNs into the HIV containing cell system. We find that PMNs will also enhance the replication of HIV. But if we put them both in, that is both chlamydia and PMNs, in with the HIV, it is more than synergistic and more than doubles the effect. The effect is in the range of 20 to 40-fold increase in the amount of replication.

Gonorrhea is a gram negative diplococci, about a million infections a year in the

United States, often asymptomatic endocervical infections, which also is known to enhance the risk of HIV acquisition.

Currently there are a number of tests available to diagnose these infections. Most all of these require some kind of a speculum exam, as most of them require specimens from the endocervix. For things like chlamydia, such cultures have been the gold standard in the past. However it may be, in fact, that PCR and LCR, which is ligase chain reaction, may in fact be more sensitive for chlamydia than the culture. Comparing these new tests (PCR and LCR) with culture, it isn't clear whether there are a lot of false positives with PCR and LCR, or whether they are really true positives and that the organism is really there and causing pathology and that the culture is just not as sensitive. The clinical features are the homogeneous discharge, the pH above 4.5 and the amine test with KOH. The KOH added to the discharge lyses the bacterial cell wall and releases these amines that have a fishy odor.

Other features that have been looked at are the presence of so called "clue cells" along with the paucity of lactobacilli seen in the wet mount of the discharge. So, these are the clinical features that have been used to diagnose bacterial vaginosis. These clinical features do correlate very well with gram staining, if the gram stain is read by an experienced person. Unfortunately there aren't very many experienced people who read gram stains for BV.

For gonorrhea, culture has been the gold standard and, again, PCR may eventually become the gold standard. There is also a DNA probe that looks for the DNA directly. I think eventually PCR is going to replace that as a gold standard. For chlamydia PCR or LCR, there is a fluorescent antibody that is less sensitive and an enzyme amino assay via Chlamydiazyme and Microtrak. I am sure are names that you are more familiar with. These are the gold standards but they are also not very useful in the situations that we are talking about.

For diagnosis and treatment in a limited resource environment some other techniques are necessary. I consider a limited resource situation to be for example, a field situation, where there is no exam table to do a speculum exam, no laboratory facilities to do the PCR, no microbiologic diagnostics, and limited or no medical personnel that can address the issues. At McGee Women's Research Institute we have been addressing STD diagnosis for some time now. We have recently been funded by the Department of Defense to look at this issue of developing some tests that can be useful in the field. Now, these so-called self tests require obviously self collection. There are several studies that have now shown fair reliability with self collected specimens for the diagnosis of vaginal infections, including chlamydia trichomatous, neisseria gonorrhea and group B strep. The sensitivity has ranged between 70 and 81 percent. In particular, our most recent study, using an instruction card with a diagram for the woman to use, was tested on 200 women for the diagnosis of chlamydia by PCR. Patients were given a Q tip and instructed to insert it about an inch into the introitus to collect a vaginal specimen.

We found that it was quite accurate. When clinicians collected it the accuracy

was 92% and when the patient collected the specimen herself it was 81%, which is still pretty good. This is compared with 100% for assay by PCR with a specimen taken with a swab at the endocervix. This is particularly impressive since the patients were not given a lot of instructions other than the card. This is the first time the card was tested, and it has certainly undergone major revisions since then. We think we can do a lot better than this. We think that we can approach the sensitivity seen when samples are collected by the clinician.

We have worked with a number of companies that have focused on developing field tests for different vaginal infections. These tests need to be simple, reliable and accurate. We are looking for things that are at least comparable with the gold standard diagnostics. In addition low cost would be very desirable because ideally these tests would not only be applicable to military people on deployment, but also to use in third world countries. In some settings, the self diagnostic kits can be used by the medical personnel because they don't require any other facilities. But in other situations, it is just the woman and her discharge, and so, being able to select an appropriate self-treatment based on the test would also be useful. While we don't recommend that people generally diagnose and treat themselves, but in certain situations it may become important.

There was skepticism about women being able to collect their vaginal samples, and they have done very well. We have tested it in STD clinic settings, where the patients in general don't have the education level or background that the military woman has.

The algorithm uses a combination of symptoms and test results. Usually these patients have vaginal discharge or vaginal itching or combinations of the two. We have used the clinical criteria of pH and amine testing, saying that pH is probably the most reliable for bacterial vaginosis. If this is combined with some test of amines, the sensitivity and specificity are further increased.

In the other test we have looked for products of PMNs. As I stated previously, large numbers of PMNs are not seen with bacterial vaginosis. However chlamydia, gonorrhea and trichomonas all induce the migration of white cells into the genital tract. Therefore if we can identify products of PMNs in the genital tract, we can assume that we have an infiltration. It is important that we have symptoms, if you do this blindly the sensitivity is not going to be very good. But if you have someone with a vaginal discharge that has PMNs in the genital tract, then you probably have one of those three organisms involved. Lactoferrin is the first one we have looked at but Defensins are probably going to be more promising, because they are more specific and they are released earlier from the white cells. There are other cytokines that we have been looking at as well.

But in terms of where we are at this point, the diagnosis using pH and amines -- and this is some data that Sharon Hillyard shared with us, it has not been published as yet -- but she looked at some 250-or-so people that had vaginal complaints. She did a pH testing, looking for pH above 4.5 in the presence of an amine odor. We have subsequently developed a dip stick test, or card test, that can detect amines with and

probably more accuracy than the nose can when KOH is added. A "positive" test would be a positive test for both of these. When we look at using both of these, 96 percent of these people had bacterial vaginosis. Some had trichonosis else as well, but this would show up on the lactoferin or the defensin test. When we look at sensitivity and specificity of lactoferrin, it is about 70 percent, which is not great, but for a field test, it is not bad. We think we can do better than this, using defensins or combinations of lactoferin and defensins.

Dr. Heine in my lab and others have already been able to develop a dip stick for lactoferin that is equal in accuracy to the ELISA test for lactoferin. We are hoping to develop a dipstick that we can put all of these tests on. The patient collects a vaginal sample, puts it on the dip stick and then reads it. We foresee a dipstick with a change in color that is positive or negative. We think that it can be done and we are in the process of testing this now.

Having made the presumptive diagnosis, treatment becomes the next issue. There are single dose treatments which can be quite effective. The small loss in efficacy is balanced by the gain in compliance, because that single dose can be taken right there. Even in the event of multiple diagnoses, there is the potential that with two single dose agents, you could cover all those organisms in the field using self-diagnosis and self-treatment.

Specific treatment options and issues are covered in the accompanying paper later in this issue.



## **Impact of Pregnancy and Pregnancy Complications During Deployment: The Role of Pregnancy Screening**

DR. ROSA

I will preface this with the understanding that deployment may be in times of war or in time of peace. But even peacetime deployments, I think we need to consider and view them as essentially wartime deployments.

When discussing the implications of pregnancy during deployment, consider a female soldier, sailor, who deploys. Either we know she is pregnant at the time of deployment, or we identify a pregnancy subsequent to the deployment. I understand that my colleagues have reviewed some issues of pregnancy complications earlier on. Ectopic pregnancy occurs roughly in one percent of all pregnancies in the United States. When not treated in a timely fashion, they can result in intraperitoneal bleeding and, in the worst case scenario, death. About one out of every five early pregnancies will wind up as a spontaneous abortion. If the pregnant service member prior to deployment is documented to have an intrauterine pregnancy with fetal heart activity, the data available suggest that the likelihood of a miscarriage goes from about 18 percent to somewhere in the neighborhood of three to five percent. Still, it is a reality that we need to deal with, be it in the battlefield or in the field hospital or on the ship out on the high seas. Hyperemesis, or nausea and vomiting of pregnancy, is a problem that most women will experience at some point of time in the pregnancy, which may hinder, impair or curtail their ability to function, at least in a comfortable fashion.

What about resource requirements? We need to realize that the moment we make a conscious decision to deploy pregnant soldiers and sailors, we need to have the medical staff, the capability and equipment to take care of any possible complication that may arise. That means the resources necessary both to make a diagnosis and to deliver the proper and necessary treatment.

Pregnancy involves the occurrence of multiple "signs and symptoms" including fatigue, increase in size and abdominal girth, nausea and vomiting as we already mentioned, and musculoskeletal changes. These all may affect the individual service member and, to a greater or lesser extent, may hinder or affect her ability to function in the deployed condition.

In terms of logistic requirements for support this is a multi-fold kind of an issue. On one hand if a pregnant woman is deployed there needs to be appropriate medical personnel available to provide her care in the deployed area. On the other hand it also involves the critical specialty that that deployed service member is filling in her particular unit or her particular ship, or whatever the situation.

Evacuation from forward areas of the deployed or pre-deployed pregnant service member from the ship, from the battlefield, from the hospital, or whatever, back to a



fixed base facility, will create an opening, a deficit in that other unit where she leaves from. That presents a problem, depending on the critical specialty and depending on the manpower and realities of the deployment.

What about complications of the mid trimester? These include premature labor, bleeding, accentuated once again, the question is whether, as a system, as a corporation, we want to engage in these kinds of situations. Do we want to deploy our pregnant service members out on the ships, et cetera, knowing that we will need to deal with these realities. My understanding is that the navy has a policy for allowing pregnant service members to be deployed in certain types of ships, but then returning them back to fixed base at a certain point in time during the pregnancy. The dating of that pregnancy and the care of the complications and the realities of those pregnancies prior to the return to the fixed base again remains open. It is a question that I just bring up for the discussion. I don't have an answer. I think there will be a lot of opinions.

The bottom line is that as a corporation, we need to make some definitive policy statements. What about societal views? What about the society's expectations? We know that the values accorded to life, to the pregnant woman, to the fetus, benefits versus risks to the fetus, are something that are held very high in our society. We know that the expectations are invariably for a perfect outcome, for a perfect baby.

The questions remain regarding how a policy of deployment of pregnant service members fare vis-a-vis what society expects, what we can do for our pregnant population, for our pregnant service members and, as importantly, for the fetus inside? What about placing our pregnant soldiers in harm's way? We have to deal with some of these issues in terms of females in combat roles, their exposure to capture by enemy with all the other connotations and situations that that implies?

What about pre-deployment screening for pregnancy? One problem is that it is not 100% accurate to screen as early pregnancies may still be missed. What about the legality of screening? Is it legal to subject a soldier to mandatory screening? Well, we do that for HIV and other things. Granted, when we say that we will do mandatory pregnancy screening, we are now targeting half the population. There is a certain issue in terms of what is just, what is equal, and what is "politically correct". What about preventing deployment while pregnant? Is it medically justified? Is there really a good, sound medical reason to say no, it shouldn't be done? Could we not compensate for that fact and for the problems that we already reviewed earlier on? Can we reduce the odds to a bare minimum to the point that the occurrence or the likelihood that an ectopic pregnancy, a spontaneous abortion out on the high seas or in a forward deployed situation would be kept at a minimum? What about being socially responsible? I cannot answer that. These are issues that need to be discussed, need to be brought into the equation before a final policy is formulated. that the pregnancy occurs shortly after ovulation.

Speaking from the anecdotal personal experience during the deployment for Desert Shield, the number of pregnancies was really noticeable. Couples were facing a separation. They were facing looking at the devil in the eye. I guess they tried to

preserve themselves through a child and it was something that was on many people's minds. We did see a certain blip or a certain increase in pregnancies right at the time of deployment.

Should pregnant service members be exempt from deployment? I cannot answer that one. That is for the group and the corporation to answer. Effective contraception might be the best way to answer or to deal with the situation, if we are going to say that pregnant servicewomen should not be deployed.

In closing, if the policy was to say no deployment of pregnant soldiers, should the service member then be held responsible and accountable for not being pregnant? That might be, and probably is, unfair, because again, we are targeting the female portion in our force for some extra responsibility that we are not holding the male part of the force accountable for. Nevertheless this is an issue that should be addressed. What if we were to say that we will allow pregnant soldiers to deploy? Are we ready to support that vis-a-vis the adjustments that need to be done. Again, will society in general support it? I think we have seen a lot of changes in our society in the way that we think about long held beliefs and customs.

My only real contribution today is just to bring up the issue of the pregnancy testing, the relative limitations. We will not be able to identify all pregnancies. We will certainly reduce them to a minimum. With that thought, I will leave you.

## **Reproductive Hazards: Military Policy Implications**

**CDR. GREGORY MOORE**

I am going to hit the highlights of what we do know about the reproductive hazards in the workplace, and particularly in the military workplace. This is a problem we have struggled with for a long time in various working groups. We are obviously trying to ensure maternal well being as much as we possibly can and are trying to ensure fetal health. They are in two different categories.

All of us in uniform have signed up to be put in harm's way. The fetus, however, has not signed up for this duty. Obviously, readiness is the main reason why we have a military. Our ability to conduct warfare and the various other missions really has to be an overriding concern when you are making any sort of military policy affecting any personnel. There is also the issue of individual opportunities and promotion. The navy flight policy is that female aviators can be waived on an individual basis, to pressurized, multi-pilot aircraft into the second trimester.

The most obvious hazards are probably under the general rubric of ergonomics. There is a constantly changing center of gravity during pregnancy. The work of certain activities, such as lifting, is clearly made much more difficult. The factor that increases the work of lifting the most is the distance from the axial skeleton. Obviously, in pregnancy, the distance from the axial skeleton that you can lift goes further and further.

A second hazard is just losing balance, slipping, having a difficult time with a changing center of gravity.

Fatigue, obviously, is a problem that make it difficult to do a mission, whether that is getting up and getting on the beltway and getting to work, or is on the flight deck refueling tomcats. The lightheadedness occurring during pregnancy, usually not a big problem. Certainly we don't have any proscriptions about pregnant women driving cars and the like. But it is not an uncommon symptom, that may not be fatal, but particularly in dangerous working environments --and clearly, many, many places in the military are very dangerous working environments--even a little bit of lightheadness can be a problem. Overuse injuries, particularly carpal tunnel syndrome, is more common in pregnancy.

Shift work is another thing that we are just beginning to understand. There is some growing evidence that shift work, particularly combined with other physical factors such as prolonged standing or extremes of cold and heat, increases the incidence of miscarriage. The frequent urination common during pregnancy becomes a little bit more of a problem as pregnancy progresses, particularly when you have to be one particular place for a prolonged period of time -- for instance a flight deck or out in the field -- and bathroom facilities are not really readily available and you can't be away that long.

Caloric intake should increase during pregnancy. Eating a lot while you are not

having nausea, oftentimes frequent small meals, is the way that many women deal with the increasing difficulty of eating a big meal when the uterus is pressing on the stomach, when parastalsic activity has been decreased due to the impact of progesterone. In a lot of military work spaces, that opportunity for frequent, small meals just does not exist.

Emergency situations often arose in a military environment. Respirators and all the various sorts of breathing protective apparatus that we have in the military, particularly on shipboard, where fire is a devastating occurrence, are hard to fit on anybody so that they really seal properly. During pregnancy there are subtle changes in the edema, in the subcuticular tissues, that can cause that fit to change. The other difficulty with respirators is the increased work of breathing during pregnancy. Of all workers -- men, pregnant women, women -- pregnant women process much, much, much more air, because of their increased respiration, the increased volume of air that they process on a permanent basis. So, they not only have the increased work of pregnancy, they may have difficulty sealing their masks, which was one of the reasons for not allowing beards in the navy any more.

Damage control is a situation which requires absolutely peak physical performance. Damage control on a navy ship makes a difference of whether that ship continues to float or not. Everybody involved has to work at peak performance. This is difficult for everybody involved. But if you are pregnant, nauseous, lightheaded, any of those kinds of problems, clearly that can impact on the survivability of that woman, of her fellow crew, and of that ship. Warships do not have elevators except for airplanes. They are up and down very narrow ladders, very narrow passageways. There is a lot of moving around, moving quickly on slippery decks, and that you need to be in good shape with proper balance.

Heavy metals are a concern, particularly lead. It is historically the most important reproductive hazard. It was actually the first reproductive hazard ever identified in history where women were moved from the workplace. We know it crosses the placenta easily. We currently are increasingly concerned with what an appropriate level of lead is in children. It has recently been reduced to almost the detectable range, and we think that a non-detectable level of lead is really what is appropriate in children. Clearly, in a fetus, we can extrapolate that fairly easily.

The other point is that lead lasts for a fairly long time. Bone lead lasts for 30 years. During pregnancy, you have a rapid turnover of calcium and a leaching of other heavy metals -- lead for one, strontium, other rare kinds of things are leaching out of the bony cortex at a much higher rate than it does when a woman is not present. Mercury is another problem, cadmium not as much of a problem although all the yellow stuff on navy ships is cadmium painted.

Noise we know is transmitted through the abdomen very clearly. In fact, some frequencies are actually accentuated. There is virtually no attenuation of sound. We know there is a lot of high level sound. We use ear protection extensive in the navy. Hearing protection is a major program in the military. Unfortunately, there is no real way

of shielding a fetus from noise. There is some evidence of hearing loss. Lynn did a study in Montreal in the 1980s with women who worked in municipal garages. Next to a city bus is about 95 decibels, which is within the OSHA standard for hearing protection. Lynn showed that there was Other pregnancy complications less well worked out, but noise may be a factor in spontaneous abortion.

Non-ionizing radiation is one of the things you get the most questions about in prenatal clinics because it is everywhere. Computers always comes up, but there are a lot of other places. Depending on which literature you look at, an association has been linked, particularly in the Scandinavian literature. However, probably the best study was done by NIOSH, which is the scientific branch of OSHA, indicating that there was not an increased risk of abortion because of this.

Solvents are a hazard. We know that fetal toluene syndrome, very much like fetal alcohol syndrome, exists. Toluene is a common solvent. Menstrual irregularities and, very interesting, preeclampsia, have been linked in a very well done study, to exposure to solvents. Heat we know is teratogenic. Increased core temperature is linked very closely to neural tube defects. We probably see it most frequently in the neural tube defect babies we see due to maternal fever, but there are occupational situations, particularly in the military. With a conventionally fired boiler in a warship in the Caribbean, it is not at all unheard of to have the ambient temperature be 130, 140 degrees. The personal protective equipment that we may be using in chemical warfare, fire, all those kinds of things, really trap heat. It was all the talk in the Persian Gulf conflict whether we could actually fight a desert war in this sort of protective equipment. I think everyone agreed that we couldn't fight it for very long.

Air travel of a variety of forms can present hazards. An ectopic pregnancy at 40,000 feet in the middle of the Pacific, for example, is a life threatening situation. Also, in a plane the oxygen tension falls dramatically. Commercial airliners are only pressurized to about 6,000 to 8,000 feet. That is pretty high. So, any of you in a passenger airplane, your PO<sub>2</sub> is in about the 60 to 65 range. Luckily, fetal hemoglobin is much better at extracting oxygen than adult hemoglobin. But nonetheless, you are going to have a decrement in the amount of oxygen that is available. Dehydration may or may not be linked to preterm labor, and planes are kept very dry. Pregnancy is also a time of increased coagulation. If you had to think of a way you could get someone to have a blood clot, it would be to make them pregnant and make them sit all scrunched up for a long period of time. Well, that is kind of what air travel is. Radiation is significant at high altitudes. Aircraft are very thin skinned. Flying from New York to Tokyo at the usual altitudes of about 40,000 feet, is equivalent to about two chest X-rays. At times of high solar activity, sun spots and solar flares, it is increased by an order of magnitude. Your occasional trip is probably not a problem, but air crew, it may be a problem. Seat belts obviously are important in air travel. They need to be worn. Women need to be shown the correct way to wear them, down below their abdomen, over the pelvis, holding the pelvis in place. But a lot of women have difficulty with seat belts.

## **Background Demographic and Epidemiologic Data on Military Women as Wives and Mothers**

**MS. CHRISTINE WAHL**

I will start with a framework that will show why it is important to look at women as wives and mothers. The family and the military have been described as greedy institutions. This means that they make demands on their members for their time, their energy, their resources. The military and the family, as greedy institutions, compete with one another for the time, energy and resources of their members.

There is evidence that both the military and the family are greedier for women than for men. The sociocultural ideal of the family is very greedy for women, not just in what has been called the second shift or the double duty. Women have responsibility for the household. They often take care of paying the bills, the daily routine, the daily maintenance of the household. There are even such things as buying the gifts for special occasions, sending out the cards, keeping in touch with family and friends. All these take a lot of time and energy, and especially for women who are in the military who are working a full shift or maybe more. In addition, data support the fact that they also have the responsibility for the health care of all members of the family. It is obvious that they have responsibility for the health care of the children and also tend to take responsibility for the health care of their spouse, making their spouse's appointments, making sure their spouses are doing what they are supposed to do on their diet, their regimen or their medication. Oftentimes these things are done at the expense to the woman's own health.

The effects of these two worlds being so greedy not only is stress but the self-sacrifice of personal health. Being a wife and a mother in a masculine institutional environment -- and the military is probably the most stereotypically masculine environment that we have -- is very difficult, especially when you are a token and you are considered a token in that environment. Being only one of a few women in a unit, a woman may have to carry the burden of the whole gender herself. It often happens that these women don't want to draw any attention to themselves or make themselves different from the rest of their unit. We have heard who don't tell people they are pregnant until they are six months along. Some may not receive care in the early trimester. They don't want any attention to be directed to them being a woman or a wife or a mother. They will keep inside and not share with their coworkers concern about their son being sick, for example. In addition to that being a mother in the military means having to deal with issues like post partum care, breast feeding and the fact that some people feel that being a mother is antithetical to being a soldier. So, while these women are at work, they will down play their motherliness, and themselves as a mother or a wife.

Let me show you some demographics. We have become a married military. Whereas in the past we were single male soldiers, we are now married military, a military



with an increasing number of women and an increasing number of joint service marriages. There are also joint career marriages in which one person is not in the military but yet has a career. The things that affect joint service couples also affect joint career couples in many of the same ways. Oftentimes these people are concentrated in the lower enlisted grades, which of course are when they have least flexibility often, and the lowest amount of pay.

Military women that are married tend to be in joint service marriages. If they are married to a civilian, oftentimes it is a retired military person. Data from 1995 showed dramatic increases in that dependents over 65. Women often take the primary responsibility for them and are twice as likely as men to have elderly dependents. This is a new issue that the military is facing.

For joint service couples, one of the biggest issues is that of joint domicile. Surprisingly, almost one in four in the Marine Corps do not live together, or do not have joint domicile arrangements. This does not take into account the fact that there are unaccompanied tours and TDYs, all other sorts of ways that there would be separations occurring. And it doesn't show for the joint career marriages the separations that would occur, because one member is transferred and the other is not. Very commonly in the joint service couple with children in preschool, one member will leave the military; most often that person is the woman.

Issues that are important to single parents in the civilian workplace are definitely important to single parents in the military. Of course, the military does have health care and has provided-for housing, which may not be the case in the civilian community. But the civilian communities aren't deployed and most often stay in a place long enough to develop community support that could help take care of the children if they must leave.

There isn't any hard data on the percentage of military women who breast feed according to the guidelines in Healthy People 2000, but all the evidence that we have--mostly anecdotal--shows that there is very little support for the guidelines.

Military policies really affect these populations. Frequent relocation, PCS moves, unaccompanied tours, separations are all especially important to people who are single parents, dual career, dual service, or with elderly dependents. It may be you can find someone to take care of your three-year-old child, but it may be more difficult to find someone who can watch over your 65-year-old mother who has Alzheimers.

The lack of a policy of non-deployment of breast feeding mothers is another issue that has been raised. It is important to note here the variability in pregnancy and the variability in being a wife and a mother. Every pregnancy is different, even for the same woman. A blanket policy that covers all women may not necessarily be the answer.

The Coast Guard now has a family leave policy that allows for up to two years of non-paid leave for both women and men not just the birth of a child, but the adoption of a child, any sort of family need. It guarantees return back at the same rate, even at the same location and same post if it is still available. So far, it has only been in place a couple of years. So, there is no evidence yet showing whether or not it has hurt one's promotion.



So far it seems to be working very well, although the vast majority of people who take this are women.

The lack of alternative birthing arrangements, such as nurse midwives, duennas or labor coaches, and birthing centers, is also an issue which has been raised in the military. A study done at University of California at Berkeley shows that having a duenna present has reduced labor time by 45 percent and the need for medication by 60 percent. Some HMOs are looking into the having duennas available.

One need the military is very good at meeting involves the case of a special needs baby. In those cases, circumstances are arranged so that the parent can stay with the child while it is within NICU or any other sort of circumstance. For example, when my first son was born, he was in the NICU for five days. I saw babies that had been there for months whose parents would come in only once a day. I talked to one mother and she said, it is either that or I lose my health benefits if I don't go to work. The military does a very positive thing in keeping parents and their babies together.

Some new programs are coming out, including the new family support programs and the fatherhood initiative, which the military is seeing birth as not just a physical experience but as a life change, and seeing people not just as dependents but as family members.

## **Personal Experience with Policy Around Family Issues**

MAJ. DAVIS

Having been a military dependent for the first 22 years of my life, moving 11 times in a family of six, I think I experienced a lot of the traditional family that we heard spoken about today. I wasn't totally naive when I accepted an ROTC scholarship for my undergraduate education. Then, after postponing parenthood through medical school and residency for about seven years, waiting for the right time to start a family, I was not prepared for the hasty six month deployment of Desert Storm and Desert Shield, leaving behind a two-month-old infant. With a supportive non-medical, non-military husband and extended family that really rose to the occasion, my son had no less than two full-time adults at his beck and call.

As a general pediatrician, I have daily contact with active duty mothers. Some are single parents. Some are without any family support system, often involved in frequent moves, some separated to manage dual military spouse assignments, and some caring for children with special needs.

The role of wife and mother has traditionally been one of supporting structure for the active duty sponsor. That seems to be continuing to be evolving to a wife and mother as the active duty sponsor.

Evolution requires change and change can occur with catastrophic events, or it can occur so slowly as not even to be noticed by a generation. I think both are occurring with this evolution, at the individual level, at the command level, and at the DOD.

One of the ways the military health care system has helped active duty women to successfully combine their career and motherhood has been the recognition of the important of the health of the child in the health and the performance of the working mother. We see this in the excellent comprehensive prenatal care, and the access to that prenatal care that is provided by the military. As well, access to care is guaranteed for infants and children of active duty or retired families, especially, the generally supportive latitude granted by local commands to accomplish well child visits and immunizations.

Childhood immunization compliance is an example of a DOD initiative, being a model for meeting one of the Healthy People 2000 goals developed by the United States Public Health Service. They set what is, for a nation, a fairly lofty but important ideal or goal for the U.S. immunization rate under two years of age to be 90 percent. By age two, 86 percent of the almost 2,000 military dependents screened by a USUHS syufy had received the basic 12 immunizations.

Some other examples of ways that the military health care system is involved is through the high quality of child care facilities that are provided at military sites close to the working mother. Many of these care providers are also able to accommodate children

with special needs.

Community support systems are prevalent in the military, as well as international networks like the National Military Families Association, based in Alexandria, Virginia. They are able to reach families, working mothers, stranded civilian spouses of working mothers, in all parts of the world through Internet. I would be remiss without mentioning the exceptional family member program, that recognizes families with special health care needs, and finds services within the military to match those needs.

Where work still remains to be done is in trying to weave together services for that woman torn between two worlds that Christine mentioned. It is very difficult to try to separate the soldier-first mentality from a mother who has a sick child at home and was up all night with that child. These two primary greedy goals exist in the same person.

My impression is that there may be a continued expectation that someone is still going to fulfill that role of traditional wife and mother, although it is no longer the female in the relationship or at the home, because she is now the active duty sponsor. Some of the ways that women have responded to that dichotomy is that women who work generally have fewer children, have their first child later in life, and go longer intervals between having children.

Working women retain the major burden of child care responsibilities, as already alluded to. Full-time homemakers spend an average of six hours a day in child care, compared to a full-time out of home working mother, who still spends an average of four hours a day for the same role. Therefore they have less time for leisure, for continuing education and for themselves and also less social time. This may or may not impact directly on their personal lives, because they are accommodating or rationalizing, but it also may impact the professional career development of military women.

The issues that I find myself listening to most often and facilitating in my practice revolve around really five. They include maternal sleep deprivation; difficulty and anxiety about arranging child care and making child care decisions, which seem especially acute when the child is four to five weeks of age and the mother has to make that decision before going back to work at six weeks of age. In addition, there is guilt about child care, especially when families are involved in extended child care situations of more than 40 hours a week. Issues around breast feeding come up a lot, and the need or the requirement to relinquish breast feeding because of deployment or field exercises, and then the guilt and anger associated with that.

I don't know if the basic issue is lack of support or lack of flexibility within the system. I am not sure that mothers are going, but But they need the acknowledgement of flexibility so that they can manage the things that are priorities of them.

I am inspired by the efficiency, the optimism, the humor and the perfectionism that I encounter in military women. I think that we all need to continue to nurture that environment, so that the evolution can continue.

## **Healthy People 2000-- The Perspective from Health Affairs**

**COL. DORIS BROWNE**

I would like to talk about some of the health policy issues that face the Department of Defense, and then to look at some of the Healthy People 2000 objectives that we have measured in our worldwide survey for 1995, to show how well we have done in certain of the areas. First, I would like to look at some of the health issues that pertain to women in the military that may not come under the health or clinical services area, but under personnel. A good example is pregnancy, which is a personnel issue, and not a health issue, in the DOD anyway.

The worldwide survey that was done in 1995 used a self administered questionnaire and included a sample size of about 16,200 personnel, roughly broken down to about 4,000 for each of the army, navy, air force, marines. The response rate was at about 70 percent. It is weighted to look at and pertain to all military personnel.

There were 13 Healthy People 2000 objectives that address issues relevant to military women. Some of them are gender specific, some gender non-specific. Reduction in overweight is one that is gender neutral. Increase in physical activity, again, is gender neutral. Other objectives include increase the control of high blood pressure; increase the ability to get that PAP test; also, an increase in getting cholesterol checked; increase in tobacco abstinence, particularly during pregnancy; reducing the prevalence of cigarette smoking; reduction in non-fatal, unintentional injuries; increasing the use of helmets and the use of safety belts. The 13th involved the use of smokeless tobacco and really pertained more to the male population than the female population.

For the last three, of course, we have interventions that are mandatory on post, so I will not highlight those areas. I will discuss the objectives that are relevant to women and I would like to first talk about where we are. A very large problem that we have is access to health care.

We would like to make that accessibility much easier. We have moved to the Tricare arena that is going to help us address the problems with access. Looking at the survey in 1995, greater than 90 percent of the military personnel were satisfied with the quality of their ob/gyn care, as well as the availability of appointments. From the policy standpoint, we require an annual health examination for all women who are 18 years or older, or all women who are sexually active, that includes a pelvic examination, a PAP smear, a clinical breast examination, and a blood pressure check. If the individual is interested in family planning or contraceptive advice, counseling should also be provided, as well as that service.

The most important concern that we have had PAP smears is the ability to get results back. We have a policy that the results must be returned to the individual within 14 days from having that test taken or, for those stationed in a remote location or

overseas, within 30 days. In the gyn area, we have divided appointment availability into three different areas -- urgent care, emergent care, and non-urgent care. In an emergency, you should be able to get an appointment within 24 hours; in an urgent situation, you within 24 hours, or one working day; if it is not urgent, within four weeks. If you are not able to get an appointment at your military treatment facility within that time period, based upon the urgency of your situation, you should then be referred to an outside facility to get that care. Now that we have Tricare with the availability of network providers to assist the military personnel, we should certainly be able to address and fulfill the policy requirements.

In the area of mammography we have a policy that a baseline mammogram must be given at age 40 for all women who are active duty, and then annually starting at age 50. If there is a clinical indication that the woman is in the high risk area, then that baseline mammogram can be obtained at an earlier age and it is based upon the provider's decision when that should be. All of the military facilities are now certified under the Mammography Quality Standards Act that is by the FDA, the act of 1992. I can say that the military has done an excellent job in fulfilling that requirement.

Another issue that tends to bring up some controversy is the availability of epidural anesthesia for normal vaginal delivery. The policy was established says that the option must be available. Some of the ob doctors and anesthesiologists, particularly in smaller facilities that may not have an anesthesiology staff, look upon this as a problem situation, but if that woman requests epidural anesthesia, it must be made available.

I think we are pretty much meeting the requirements there.

Going on to look at how we have done in the worldwide survey, 73 percent of the respondents felt that it was very easy to get that appointment within a time period that they were satisfied with, and 63 percent felt it was easy to get that appointment where they were currently stationed. Air force women tend to be a little bit happier with their care than the other services. But overall, we were meeting the goal there. When we looked at those who were less satisfied with their care in the military, we tend to find that unmarried, younger, enlisted, or minority women and those with less than a high school education. When we look at the percentage of minority women in the military, we are looking at about 48 percent. That percentage is in the army. There are about 350,000 women in the military on the active duty. That runs about 14 percent of the active forces.

We compared satisfaction with care within the United States and out of the United States. Outside of the United States, the availability of care is truly dependent upon the military treatment facilities, whereas within the U.S. you may be able to be referred to outside facilities, and now with Tricare, the network providers. But we saw no difference in the satisfaction rate OCONUS versus CONUS. So, the facilities that we have overseas are doing an excellent job of taking care of the needs of our military personnel.

We looked at stress in the survey; as compared to Healthy People 2000, 35 percent of the women felt that they had some stress. The stress questions were related to either work place or in the home or family situation. Again, the percentages are relatively

high again in the minority population and less so in the non-minority, and are also high among the unmarried, the less educated, and those younger than 20 and the 21 to 25 year olds. One in three of the women experienced significant stress or a high level of stress, and 50 percent of the women in the Marine Corps tended to experience what we call high stress, or what they indicated.

In the areas of stress or what really were the stress points, there was a little difference in male and female here. Both groups felt that separation from family was high on the list. Women felt stressful having to work in a male environment in certain situations. Women tended to find that change in the family --a birth, a death, an illness -- was much more stressful than deployment for the women. All of them felt that their military life was a lot more stressful than their personal life.

In the area of maternal and infant care, we had available prenatal care and that this prenatal care was available early on. We also asked questions about the use of alcohol and other substance use during pregnancy. That also included the use of tobacco. The number of women in the survey that responded to having been pregnant in the last year was 18 percent and within the last five years it was 38 percent. We did very well in availability of prenatal care for the women who became pregnant -- 80 percent had prenatal care beginning in the first trimester, and then again, 10 percent received care in the third trimester.

The Healthy People 2000 objective wanted to decrease the use of alcohol in pregnant women to less than 20 percent; we had done better than the Healthy People 2000. The proportion of women that did not smoke during pregnancy, the Healthy People 2000 was abstinence greater than 90 percent. we were very close to that goal, within 10 percent. We had 84 percent of the pregnant women did not smoke. Heavy users, those who smoke more than three packs a day, is a very small percentage, and we hope that we can continue to decrease that area.

In the reduction of cervical cancer, getting PAP smears, we did very well. Ninety-seven percent of our women received their PAP smear, 95 percent had one within the last three years. In getting the results back to them, we rated 90 percent in that particular area. The Healthy People 2000 objectives were 97 and 85 percent.

In the health behavior and health promotion areas, we now know that cardiovascular disease is very important for women, something that we had not focused on in the past. Watching our diet, exercising and controlling our blood pressure are all very well, as well as controlling our cholesterol or lowering our cholesterol, all add to the fact of decreasing our cardiovascular risk. Finally are injury prevention and reducing the risk of sexually transmitted diseases. The survey addressed the use of condoms in that area. The number of women who had used a condom in their last sexual encounter or within the last year was greater than 35 percent.

In summary, our ob/gyn services seem to be fairly accessible to the majority of women studied. They are satisfied with the quality of care. Their PAP smears are done routinely and hopefully meeting the policy of an annual basis. We can still work on the

prenatal care. We are close to meeting the Healthy People 2000 goals of getting prenatal care during the first trimester in our women. We still have a third of our women with a high level of stress. We need to look at that area of perhaps decreasing some of the stress of working in a male hierarchical environment, so that our women would feel more comfortable and less stressful in that area. In smoking during pregnancy, we have succeeded in accomplishing the Healthy People 2000 goal, but we need to abstain from smoking altogether. Abstinence from alcohol during pregnancy and certainly the complication that goes with that is very important. While we are at 85 percent abstention in that area, we could still do better at minimizing the complications from having children born with fetal alcohol syndrome and some of the other complications.



## **Constructive Advocacy**

CAROLYN BECRAFT

My history relevant to the military and women goes back a few years. First of all, I enlisted in the army, was commissioned and served on active duty for five-and-a-half years. During that time I married my husband, who was also an army officer, so I lost my housing allowance, because at that time a woman could not be married and live in quarters and have a housing allowance. Then I got pregnant and lost my job, because one couldn't be pregnant and be on active duty at that time. I have lived all of my adult life in the military community. I am still married to the same man. He retired two years ago. During this time, I struggled to develop and maintain a career, but I have been unemployed a lot. So, I have a different view from most people who have held the job I now have. It is sort of like, been there, done that.

I was asked to speak today about "constructive advocacy". I have spent the last 10 to 15 years of my life as a policy advocate and in deciding what I was going to say, I went back and thought about my experiences with being an advocate in and for the military. I think that advocacy is a process, whether you are inside a system or outside a system. So I wanted to lay out the process as I perceive it.

I have been involved in a number of things. I designed the Army Family Action Planning Process. I was with the Women's Research and Education Institute and I orchestrated the political effort that finally led to the repeal of combat exclusion laws. It was a long struggle and I have many compatriots from this struggle in this room. Rosemary Mariner, Pat Foote and many other were involved in this and were mentors for me. I was in a position outside to work with different groups, the political groups, the women's groups, and with the policy people inside and outside the military. We have made a lot of different things happen.

Advocacy is inherently political which basically means that there are two sides to the question being considered. In order to effect change as an advocate, you have got to construct goals. There is almost always a factual versus an emotional component. It is best to accentuate the positive and the factual and to eliminate or diminish the negative and the emotional from your argument. To be successful in this, you have got to acknowledge the opposing arguments, and you have got to figure out a way to raise the level of discussion.

When you present your argument your information must be organized appropriately. Every slide and every sentence is important. People that do not take your position will use anything that you say that makes their case, and use it. Always consider whether a sentence or statement can be used out of context by the opposition.

I am going to review a sort of case study describing how we addressed an fairly controversial issue within my deputation within the last year. Then I am going to suggest how the same techniques might be applied to other issues that are important to women in

how the same techniques might be applied to other issues that are important to women in the military.

The first example I want to use is that of policy regarding spouse employment. I was one of those that was involved in creating the legislation to provide preference in civil service jobs, for military spouses as they moved. There were data such as the unemployment rate. There were important facts. Spouse employment affects readiness. Spouse employment issues affect the family's willingness to move. It obviously affects families' income. In addition with the draw down there is a significant decrease in the number of civilian jobs on the military base itself.

The jobs are in the outside community. If you are going to maintain or sustain the spouse employment program, you have got to have somebody with the grade and the skills that can work with the outside community for jobs. You first of all have to define what the issue is and you assemble your data and your sources of data. Then you organize your information.

We had to identify the problem and the number of spouses in the labor force. Over 60 percent of our spouses are in the labor force, either full or part time. That is greater than their counterparts, but we still have a higher unemployment rate, because many of our spouses are involved in part time work and low income work. Next you have to look at the pros and the cons, it is very important as an advocate to identify the pros for your position and identify the cons for your position. If you are an advocate, you need to be able to address the negative arguments or at least acknowledge and try to diminish the negative arguments..

Once you have assembled your data, you need to develop an action plan. We used a DOD spouse employment form as a "needs vehicle". If you are going to raise an issue to the policy level, you have to find a policy sponsor. We had a three day forum and invited all of our stakeholders. We invited commanders. We invited our advocacy groups. I invited all my counterparts in the services. We invited enlisted spouses, officers spouses, single women that ran businesses, men that were spouses. We had the whole group.

For a three-day period they looked at employment and examined the obstacles and the issues. The group worked in this way for three days and then presented an action plan, to me, as proponent of employment policy. This plan identified the issues and proposed possible solutions for these issues. We ended up with a proposal with high level endorsement from people who could make a difference on the policy.

Whenever you develop an action plan you need to prioritize what your objectives are. In this case, it was fairly easy because everybody agreed that spousal employment was an issue. Once you have identified the issues, you need to select those issues where you have agreement, those items that are easily resolved, so that you can build a momentum toward where you want to be. After you pick off these "low hanging fruit", you then determine what is really important to you and what you what to discard or not take up. Then you develop a very short, concise message about what is it that you want

to accomplish.

In this case, we wanted to accomplish the expanded number of jobs for military spouses in the civilian community surrounding military bases. We wanted to expand the employment opportunities and provide more alternative ways they can be employed.

Once you have developed your action plan, then you can prioritize your objectives. Then you need to identify and educate your constituencies. In this case, we worked with the military leadership. I chaired a family policy coordinating council, which included individuals at the two to three-star level. I am also the executive agent for the quality of life executive committee, which includes the DESPERS and the assistant secretaries of all the services.

We briefed our action plan and got conceptual concurrence to proceed. We also worked with outside groups like Catalyst, women's organizations, and with media outlets to work on developing stories for installation newspapers and so forth. We tried to educate in every possible way about the agreed-upon position.

The next thing in an advocacy program is to look for and exploit windows of opportunity. These opportunities may be positive or they may be negative. For example, the leadership may change, going from a leader who is sympathetic to your cause to one that is not. In this case you have to figure out different ways to deal with the issues. Exploit opportunities that may have unexpected publicity. Collaborate with other groups. The process is constantly changing.

But the most important thing and the bottom line is, that if you want to be a constructive advocate, your goal is to stay in the driver's seat when you are driving your message.

Nothing raises more emotions than issues of military women. I chose to do talk first about the issue of spouse employment because I in my current it is a good example of how we worked internally.

Next I would like to discuss the 10-year march toward the repeal of combat exclusion laws and the current discussions of pregnancy policy for the military. I believe that many of the issues there are very much the same. You are talking about emotion versus fact. For example, people talk about how all women throw up all the time. I have been pregnant twice and I never had morning sickness and probably was healthier than I was in all my life. Women have been criticized by their supervisor for having to take two 15-minute intervals to express milk during the day.

I really want to challenge you on what I think some of the real issues are. As an example, on DOD pregnancy policy, we have no consistency across the services. I think the larger issue is that any time pregnancy policy issue is discussed, women are not there. It is defined as "combat readiness". It is often defined in a way that it is not necessarily factually correct, and in a very emotional way. It is important to separate the emotions from the reality.

The way data are organized and presented is very important. For example, the statistic I often hear is that 18 percent of women are pregnant at any one time. This is not a fact. There is a period of time when women are pregnant. You can look at the real

data and extrapolate. Most women who have children are pregnant between the ages of 22 and 25 and most have one to three children. Maybe during a woman's 20-year career, eighteen months of that time she is pregnant, of which the command knew about it for ten months. But how it is defined is that 18 percent of military women are pregnant at any one time. The implication is that women cannot control their fertility.

When you organize your positives, they include; having a baby is not a bad thing, being a parent is not a bad thing, being pregnant is not an unhealthy state. It really helps if you can get outside people to come in, because these things are never challenged by outside people. They know that women in the military are not the only women who work that are pregnant. They are not the only women in high risk jobs that are pregnant, nor in stressful jobs that are pregnant. There are experiences from other work places that can bolster your case.

The cons, the readiness issue is a con and it needs to be taken seriously. But I think the bottom line is that you will never be able to address pregnancy policy well until you address the single parent issue. In my personal opinion, that is the Achilles heel of the issue. But I think if you isolate single parenthood, you would find that the problematic part of the readiness comes from first term enlisted women.

Officer women and women past their first term of enlistment control their fertility. Age is a factor, motivation toward career is a factor. But the first term enlisted pregnancy is an issue. I think we cannot dodge it. It is an issue because of the age of the women. It is an issue because they are young people. It is an economic issue, because they don't have money. There is an issue because they are also very low on the totem pole and they cannot make the system work for them. The older you are, the higher you are in rank, the more you can make the system work for you.

The other part on the pros and the cons we have to deal with concerns birth control. Do we have good birth control? Is it consistently available? Do we have good education, regarding birth control, especially for our youngest service members?

For each issue, you must do your homework and define the cons and decide how you can frame the issue around the cons, as well as the pros. Doris Brown would say that pregnancy is really a personnel issue, I would say this is really a medical issue, because the personnel folks define it by what the medical people tell them.

What does it really mean? Why not pull together a forum for discussion. You want to be in charge of this forum because you want to pick people who have good data. You want physicians. You should also have commanders. You need to hear from the guy on the ship who had women who got pregnant to legitimize his issue, because it is legitimate. You also need to hear from the commander who had a woman or two who were pregnant and it was not a problem because he worked around it just like he worked around every issue.

You don't need to have an infantry commander because then you will get his fears; not that he is not legitimate, but he doesn't have women so he doesn't have experience. You need to have voices from organizations that have women.

You have to deal with people who say things such as, "is a woman going to throw up in a cockpit?" I would say that a woman who is pregnant is not going to have morning sickness any more than a pilot who had a bender the night before is going to feel woozy going into the plane. You need to articulate the arguments and de-mythologize what we are talking about. And as I said before, there have not been women involved in this process in a substantive way. However, I would argue that it cannot be just women. Men must be included.

Through this process, if you have a sponsor, then they have to receive a report. Now, if there is one thing I have learned in advocacy, is to be proactive and help your allies be reactive. Provide them with a document. When you have a sponsor who is an ally, and a document of some kind, then people can come in and then start working.

It is important to prioritize. Decide what you really want in the end. What is the most important to you? What is it that is really achievable? What can you get quickly, because it is important to get some things quickly, in order to de-mythologize the process.

If there is something that is really important, but so is controversial, I would argue, leave it for last. Let me give you an example. When I first started with this Ford Foundation grant in the early 1980s working with the women's groups, there were two issues that I refused to touch. I got raked over the coals by them, but I refused to touch them.

The first one was the differences in standards of enlistment for women versus men. There were higher standards for women. They required a higher test scores, they required higher educational goals, and so forth. I refused to touch it because it was not win-able, and because I also felt that for a woman going into the military at that time when the percentage of women was eight percent or less, it helped for them to be smarter and have more education than their male counterparts. So, to me, it wasn't worth the fight.

The other issue I would not pick up, was the gay issue. There was a lot of pressure from the women's community to take that issue up. I would not do it. My strategy on that was, if you are going to argue the gay issue, you will argue it for 90 percent of the force which is male, not 10 percent of the force which is women. I got beat around the head and shoulders, but why lose my credibility on an issue I wasn't going to win when there were many other issues where I could make a difference.

What you want to do is define the issue. Let me give another example, that of women in combat. One of the things that I spent about five or six years doing is defining combat. The media and the services and so forth defined combat using a very loose definition. They talked about "drafting women into combat", and this was seen as clearly negative.

The combat exclusion laws pertained to the Air Force and to the Navy. There were never any combat exclusion laws for the Army. The army policies referred to specific jobs. So, if you look at how each service categorized jobs, whether they were

combat, or combat service support, and compared the jobs, you could, in a sense, pit one service against the other.

You could say, why couldn't Air Force women fly jets? Rosemary Mariner has been flying jets for the Navy since 1972. The air force put women out in the support side of the house for flying. They defined the fighter plane as their "combat" thing. The navy defined it as the ship.

So, Rosemary could fly any aircraft in the Navy inventory. She just couldn't fly it on a ship. So, when it came to saying that women can't fly aircraft because what ever, CAPT Mariner is a fighter pilot and has been since 1972. What do you mean? So, you just compare and contrast.

When it came to Desert Storm when I have talking to the media from all over the world, I finally got to the point where I was not going to do "Combat 101" any more. I would not talk to the press until they read my fact sheet. I wanted to be in control of the terms. I said, "these are the terms of the debate. Once you read this, then they will talk about it." I didn't care who they were. I said, read the fact sheet first, then we will talk.

The thing that worked for the repeal of the combat exclusion laws were a couple of things. We identified a cadre of people to be able to participate in public discussion. If anyone was having a conference on women in the military, I had five people and General Foote had five people. We all had the same information. We all worked together collaboratively. We all had the same handouts. We did forums all over the place.

Another thing that happened with Desert Storm is that the Pentagon lost control of the message. The message was local, all the reserve units had local stories. Every state had a local story. These women were truck drivers and doing their jobs. It was the biggest educational tool to the American public about what women do in the military. Every morning, in the media it was, "hi, mom, how are you doing?" They followed it everywhere.

I think the second thing most riveting thing was the interview with Marie Rossi. Remember, she was the pilot who commanded the aircraft squadron -- she had to fight to keep that job. She was a commander, but she fought hard to do it. She is a soldier. This is what she does. The story was riveting to the American people. Those two things I think were pivotal.

The other thing that was pivotal is that the war ended on the 28th of February or the 1st of March. I believe that if it had ended in September, the repeal would not have occurred. Here is why. It ended just in time to get into the authorization cycle in the Congress. So, although the hearings had finished, they hadn't marked up yet. So, Pat Schroeder put forward a demand to repeal the combat exclusion law for the Air Force only.

Now, why did she do that? You must pick your battles. Because an officer in the Air Force admitted in congressional testimony that the only reason women were not flying jets was the law. They said that they could fly them, that they were excellent pilots, but the law precluded it.



Pat Schroeder had that admission and then there had been pilots in Desert Storm and they did their thing and everybody saw it. So, she introduced that and Les Aspen let her do it. She put it forward and it passed 100 percent in the full armed services committee. Talk about the emotion of the moment. They all had constituents. They couldn't vote or denigrate the accomplishments of Sally Sue and Jimmy Joe. They couldn't do it. So it passed and went over to the Senate. Now the House had always worked on the women in combat kind of stuff before. There had been a number of hearings on women in the military hearings on the house side over the years and the Senate really never cared. This was not a statutory issue. So, this was new to them.

Initially, John McCain and Senator Warner were saying, yes, it sounds like a good idea.

Then it was delayed. We thought things were going fine. Pat Foote and a group of us started working the Senate. Now, I have to tell you that women's groups had never worked the Senate before. We knew our contacts on the House side because of previous issues, military women's issues, family issues, spouse deployment etc. We knew the House side. We didn't know the Senate side.

We started making appointments and we learned that McCain had changed his mind and that Warner wasn't probably going to be with us. So, we had a problem. Now, the Senate had hearings. There are ways that hearings are orchestrated and I won't make a judgement. I will just tell you how this hearing was organized and then go back to what I told you before about who you want to have come to your conference.

There were women and men from each service, one enlisted, one officer, one male, one female. For the Air Force and for the Navy there was a woman commander and a male enlisted person. For the Army and the Air Force, they had male infantry commanders and women enlisted.

So, the Air Force and Navy commanders -- both women -- said, yes, I commanded this, this and this and I have been very successful. The guys said, yes, I have worked for women, it was no problem. The infantry guy said, gee, I don't know about women in combat and the enlisted woman said, I don't want to go to combat. Now, if you ask anybody, do you want to go to combat they will say, no, that is why they joined the air force. But that is how it was set up.

So, then they went into their mark up. But they still had a political problem. They can't not validate the experience of their constituents. So, they said, we will study it. This is a bureaucratic way, by the way, to delay things forever. That was what came out of the Senate mark up.

We had a house position on repealing the ban on women flying aircraft in the Air Force. Beverly Byron was chair of the manpower committee in the House and she added the Navy to it, because she said, look, if you fly a plane, you fly a plane. But Pat Schroeder, very shrewdly, only picked what she had acknowledgment for.

So, now you had repeal of the ban on women flying aircraft in the Air Force out of the House and you had studied it in the Senate. It was going to then go to a vote on the



Senate floor. We had three weeks to put together a coalition of women's groups, military women, the outside groups, retired military women and men to pull the facts together and try to educate the whole Senate.

What we did, we broke it down into who is going to be with us and who was not. You pick your battles. You are only going to make one call and give them a fact sheet or whatever.

Who do you not waste your time on, who will certainly not see your side? Then you work up the middle, who was possible, most possible. That is where we spent the bulk of our energies. We just kind of did our own quick and dirty kind of assessments, working with a number of staffers.

We only had a small number of days before the vote. We hit every member of Congress, some more than others, on military women. Now, how can military women do that? Well, this was not a Department of Defense policy that they were opposing. This was a law imposed by Congress. One could argue, if military women didn't care about repeal, then it is not worth the effort. So, they worked but they did not lobby. They were there to educate. We went in groups.

The question was asked, how do you think your member is going to vote and then we had our person tell what they did in the military. This worked very well. This is what I did, this is what I do now. This is why I would like to have a change, because this is what it hinders the way it is now. We addressed the readiness of the unit. We spent about three or four days and then it came down to vote time.

The Senate rules are very arcane. I still don't understand them. We were numbers of senators who spoke for our side. But the issue really became, were they going to hold us up procedurally. We didn't know. We were up in the balcony the next day. And this is just my own personal assessment. When they opened up and Nunn tried to modify his measure, I knew we had the votes. He would never try to modify the measure if he had the votes. What we argued for was, stick with the repeal of the aircraft exclusions in the Air Force. You already have agreement, even in the Senate, that women can fly planes. We have seen them do that.

If you must have a study, then don't do the study without the repeal of this one issue. Keep it focused on the issue at hand.

We had to do that, really, because Senator Nunn had reservations. There were others people that had their reservations. We were trying to create a win/win for these people. In the end, they did split it into votes. I don't know what happened. Something occurred and the first vote was on whether or not they would have the study. That passed 96 to 3. The second vote was on the aircraft exclusion. That passed 69 to 30. That is over two-thirds. That, in anybody's ball park, is a clear, decisive vote.

It is interesting how the vote broke down. I went back and looked at it. We didn't carry those we were sure would vote against us, but we didn't carry some of the really moderate civil rights types either, that were older. The issue generally broke down on age. The Vietnam era and younger voted for it. Korean War era and older voted against

it. The vote broke down as really more of an age thing.

In the end it was that window of time. Had we had to start in September, we never would have made it, because the war was over and we were down-sizing. On any issue, you have to exploit the opportunity when it occurs. If military women had not been willing to come forward at that time and speak, it would have been another 20 or 30 years. They had to exploit the opportunity.

You have to be ready for the negatives. My bottom line is, you have got to stay in the driver's seat on this message. In many cases, women are not even at the table when the most important issues for a career woman are defined. How do you have a family and maintain your job and contribute to your workplace. What are the areas where it is most difficult?

The Coast Guard has a policy on pregnancy. Maybe that is a policy we ought to look to. This is a time of change. You have got to exploit opportunities. We are reshaping our force. When you look at the work force projections, you see that people are coming in and out of the military, not at the bottom and working up, but in at the middle based on skills. Maybe this is the time to work with the reserve folks, to look at transition in and out.

I didn't have the opportunity to join the reserves because I got pregnant and lost my job, so it kind of foreclosed my options. Later on, I could have gone back and joined the reserves. I could not understand at the time that it didn't matter that my peer group was already a major and I would have to go back and be at a more junior rank. In the long term of service it wouldn't matter. Some people join the military at 25 and some join it at 18. I think women have different life cycles anyway. Most of the energetic women that I see that I work with are 50 years old. They don't want to retire. They have just gotten finished with a family and they are on. So, we have got different cycles and I think the same for some men.

So, that is my view of constructive advocacy. I leave you with my case study as an example of how to attack an issue. You can extrapolate this process to the issues around pregnancy. Define the issues and look at the data. Is pregnancy really a disabling condition? What is the incidence of pregnancy in the military? Every slide that is presented that says that 18 percent of military women are pregnant tells a false picture. Think of how many women are in the military? Are 18 percent of those people pregnant at any one time? Do you really think so? That means every fifth woman is pregnant? Look around. It can't be true.

There are times when people are more likely to have children. Once you have a child, many people try to space the next one. For many people, they cannot manage having children and being in the service. It is too difficult and they make a choice to leave.

But that is not the discussion right now. The discussion right now is the department's pregnancy policy, and whether it is appropriate. Maybe it is appropriate, but I think we need to look at it. I would suggest that the medical departments at the political

level can pull a group together. All of the constituencies need to be represented in order to get buy in with the conclusions. You need to have officer women, enlisted women, commanders, sergeant majors.

Then there has to be a report. You have got to have a report because bureaucracies are reactive, not proactive. Then you have to really work the constituency, organize the advocates, and you won't miss.

Research is an important way to do it but while we need the research, but we need to be sure that policy articles, editorials, articles in military publications, all this data together. Once you have the data you have to look at how you are going to organize it.

So, with that, I will conclude my presentation and leave you with food for thought

## **Chronic Dieting in Active Women: What are the Health Consequences?**

DR. MELINDA MANORE

My job today is to try and answer the following question: what are the short- and long-term health consequences of chronically restricting energy intake for weight loss or weight maintenance in physically active individuals?

I think you are all pretty aware that American women are obsessed with dieting. This is information from a recent survey, where 33 million American women reported they would rather lose 10 to 15 pounds than achieve any other goal. An article that Dr. King did -- I think it was 80 percent of their female cadets said that they would like to lose weight. Forty-five percent of Americans consider themselves to be overweight. Half the women say that they are overweight. They are not all overweight. In the latest NHANES data, about 35 percent of women are either overweight or severely overweight, and about half of these women are dieting. About 38 to 40 percent of American women say they are dieting. About 24 percent of women who say they are dieting really are underweight or normal weight.

In the U.S. culture, thinness is associated with beauty, competence, self esteem and self worth. Young girls are extremely aware of their body image and weight.

These young women use very poor tactics for weight loss. The latest statistics show that they are turning to smoking, and that these women use smoking as a means of weight control. Many women I am talking about an individual consistently and successfully restricts energy intake to maintain an average or below average weight. This average or below average weight is really based on their perception. It may or may not be below average, based on body mass index. The weight cyler is an individual who may lose the 20 pounds and then gain the 20 pounds, may lose the 20 pounds and gain the 20 pounds.

I want to really focus on these people, that you may think of as the restrained eater or the restrictive eater, the individual who is constantly monitoring what they eat for weight maintenance or weight loss. Most of the information I am going to show you today is data we have collected at Arizona State University, but it is representative of the literature in general.

To be included in this meta-analysis, these studies had to have a programmed exercise, where the subjects were put on an exercise program and they are monitored. The diet also had to be monitored. They had to measure resting metabolic rate, and they also had to do some measure of body composition to give fat-free mass, because metabolic rate is best expressed as per kilo fat-free mass.

Almost all the studies used females; there were just a few males in the studies. The N size, number of subjects, was 631. The types of diets that were used were low fat, high carbohydrate diets that were less than 1200 calories a day. This number is lower

than the resting metabolic rate for everybody that is in this study. The types of exercise ranged from about 30 to 60 minutes a day, four to five days a week, at 50 to 70 percent VO<sub>2</sub> max, which is a typical type of exercise program.

We found that resting metabolic rate significantly decreases with diet and with diet and exercise. The reason that exercise has been added to dieting is to preserve fat-free mass, which we know is the primary predictor of resting metabolic rate.

Resting metabolic rate significantly decreased more in the diet than the diet plus exercise. So certainly, combining the diet and exercise seems to help preserve some lean tissue and keep metabolic rate higher, except when you get into severe energy restriction combined with high exercise.

An article that was published by Donnelly in 1994 in the International Journal of Obesity looked at the percent change in resting metabolic rate before and after a 12-week diet or diet plus exercise program, where the diet was 525 calories a day. I personally feel like these are very extreme diets. Very low calorie diets are defined as less than 800 calories per day. They put 115 obese subjects on these various diet regimens: diet only, diet plus strength training, diet plus endurance plus strength training. Resting metabolic rates significantly decreased in all groups, relative to fat-free mass. What you would like to do is keep the amount of energy you need per kilo of fat-free mass the same. Weight loss was comparable.

The two diets that produced the worst results were the diets that added exercise, either endurance or endurance plus strength training, to this 500-calorie-a-day diet. In essence, these people were taking in 500 calories in food and expending 500 calories in exercise.

Can an increase in metabolic efficiency occur in active individuals that appear to be eating less than required to cover the costs of their physical activity? We are interested in the individual who exercises 2700 calories a day and only eats 2,000 calories a day. We define metabolic efficiency as the situation when the decrease in resting metabolic rate exceeds that explained by the concomitant loss of fat-free mass. We started with physically active males, and we did this purposely, because we wanted individuals who weren't concerned about how much they ate. But we were looking for people at the extremes of the bell-shaped curve, people who exercised a lot. These males were matched for fat-free mass weight, body composition and level of energy expenditure. They were expending about 4500 calories a day, except that our low group was only consuming 3,000 calories a day, and our adequate group was consuming 4500 calories a day.

We put them in the metabolic chamber over a 24-hour period. Our low group had significantly lower 24-hour energy expenditure than our adequate group. Their resting metabolic rate was significantly lower. We also measured basal metabolic rate; it was significantly lower. Their sleep energy expenditure was significantly lower, and their spontaneous physical activity, which is measured in the metabolic chamber by Doppler radar that measures every time you move. If you teach class, you know the fidgeters

versus the non-fidgeters.

Our adequate group really moved a lot more, and our low group really just got in the chamber and just sat there. That is one of the hypotheses between why some people can seem to eat more and not gain weight, because they really do a lot of fidgeting, and that is very hard to measure. One person can sit for an hour and the next person is moving around, switching their legs, moving their feet, and they actually are burning energy during that time.

In our studies in males there is some metabolic efficiency going on. They are eating 3,000 calories a day, but they certainly were not eating enough to cover total energy expenditure. Yet, they were maintaining body weight. Then we decided to look at this in women. First we looked at women that we classified as endurance athletes, exercising about 12 hours a week. Then we looked at recreational athletes, people who exercise at least four hours a week. Their energy intakes are lower than are endurance athletes, but they are expending maybe around 2700 calories a day. We then measured resting metabolic rate. These groups are significantly different based on fat-free mass and resting metabolic rate; our endurance athletes had significantly higher resting metabolic rates, but we didn't see the significant difference that we saw in the men. We are still trying to figure out why is there more variability in women than men. Part of it may be our basic conclusion, women are just different, but that is really not good enough for a research article.

We only asked these women if they menstruated, and then we measured them within the first five days of menses. Now we have been doing more studies with women and their menstrual cycles, and realizing there is so much variability, and that may be one of the factors.

I would like to talk a little bit about the influence of energy drain or restrictive energy intake on the development of menstrual dysfunction. Many factors may contribute to amenorrhea or menstrual dysfunction in active women. Energy drain or negative energy balance can certainly affect energy reserves, body weight, fat-free mass, how much glycogen is stored. We know that thyroid hormones will decrease on a diet, we know that cortisol will increase. We also know that it can change total energy expenditure, decrease the metabolic rate. They don't eat much, so the thermic effect of food is reduced. Their energy expenditure is high, spontaneous physical activity may be low.

This in turn can eventually shut down reproductive axes, and may have an effect on bone mineral density, exercise, performance, cognitive ability, immune function. Some people are looking at cardiovascular disease because of the role of estrogen in protecting from cardiovascular disease and reproductive function.

We have just completed a study looking at the treatment of exercise-induced amenorrhea with a diet and exercise program. Many physically active women, especially athletes, do not want to go on oral contraceptives, because they feel they will gain weight. They have heard rumors that it may affect performance. So as you all know, you can't get

people to do something they don't really want to do very badly. Also, we wanted to address the underlying issue. Just giving hormones may not take care of the underlying issue.

We took seven amenorrheic active women, mean age 22 years of age, body mass index of 20, body fat around 14 to 15, mean age of menarche at 2.9 years. We asked them to decrease their exercise energy expenditure, which is tough for some of these individuals, and we had them add one rest day a week, taking the day that they did the least exercise and make it a rest day. Then we monitored their activity to make sure they don't add it back to another day. We also asked them to increase their energy intake, which is a real novel idea.

We asked them to eat one serving of Gator-Pro a day. In 11 ounces, there are 360 calories, 50 grams of carbohydrate, 17 grams of protein and seven grams of fat. In general, we saw a slight increase in body weight, in fat-free mass. We saw decreases in cortisol. We saw an increase in LH, FSH and estrogen to more normal patterns and resumption of menses in five to seven subjects. The other thing that we have been measuring is their mood, their level of anger and frustration. In all of them, we have seen improved performance.

In any study that you pick up in active women, if they are consuming less than 1900 calories a day, they probably have poor nutrient intakes in some area, either in the vitamins or in the minerals, if they are not supplementing. We expected based on their diet records that they would have poorer micronutrient intake than our control group. We also looked at the percentage of individuals with poor iron, zinc, magnesium, folate and B12 status. We are still looking at their B6 status. We are surprised to see that we didn't have lower parameters here, that in essence, in many ways they are very similar to our control active females.

In trying to figure out what was going on with this particular population of sub-clinical eating disordered athletes, we looked at their use of supplemented foods. They use a tremendous amount of sport and fortified foods. This surprised me. We found out is that they use these things instead of meals. Half or more of their diet is really engineered food. This is a new phenomenon in the last five years, that women have turned to eating more of their food from these engineered foods, which is fine for some micronutrients, but what about all those other micronutrients that we need, and what about all the antioxidants and the things that we talk about for good health? I don't know whether in another five or ten years we are going to see problems for women who have just chosen to eat very processed, highly engineered foods, instead of what I call more real foods.

We also looked at the level of menstrual dysfunction. Sixty-one percent of the sub-clinical eating disordered athletes had some level of menstrual dysfunction, compared to our active controls. In another study we looked at the micronutrient intakes of active young and midlife females. These are recreationally active females. Young was 18 to 30 years of age. We predicted that our young women who are recreationally active



would have poorer nutritional status than more mature women who have got a grip on life. We looked at their blood levels, and we were surprised to find that some of the women that I have ever seen with the poorest status were in our midlife group. What was interesting is, many of these women did not supplement. They are eating 1500 to 1600 calories a day, and they are extremely active. They are aerobic instructors, they are very conscious of their weight, they exercise for weight maintenance. We wanted to look at women who had been active for 20 years, and see whether this would really impact their status, and we were pretty surprised to find the exact opposite of what we had anticipated. Also, we did measure the resting metabolic rate on these women.

Just a little bit about the psychological consequences. If you have worked with people who exercise and try not to eat, you know that there can be real depression and mood swings. We have some women we were working with with incredible mood swings. There is increased obsession with food and body image, a cycle of binge-and-purge eating episodes.

We mentioned a little bit about the stress that military women face. How can we help people get off the dieting merry-go-round? I think certainly explaining the effects of prolonged energy restriction on resting metabolic rate and therefore weight loss. In America, we think that more is always better, and in the dieting arena, less is better. We eat less calories, we exercise more. Actually, that is the absolute worst scenario that someone can do.

I think we want to emphasize avoiding long periods of not eating, so people get extremely hungry and emphasize a realistic body fat goal for appearance and performance without constantly dieting, an acceptable weight goal that you really can maintain without dieting.

Women who have a normal percent body fat, which is 20 to 23 percent body fat will tell you they want to lose ten pounds. They are normal, and they think they are fat.

In summary, I don't think we can do enough with education. We have to repeat the message many, many, many, many times, and you may get a few people picking it up each time. A lot of women that I talk to, their husbands have told them what they ought to weigh. I think we need to get away from that, and pick an ideal weight for yourself.

That may mean looking back at family and family history and genetics. When I ask women, what is an ideal weight for you, they will give me 110 pounds. When is the last time you weighed 110? Well, I think I was in the sixth grade, and I flew by that number. That is not a realistic weigh. I am a real believer that you have to exercise, and you have to make lifestyle changes and exercise behaviors, making it part of your daily life, not just having these little programmed kinds of activities, but learning how to walk to the grocery store once in a while, or to take the stairs instead of the elevator. Lastly, it has to be a family affair. You can't just have one person in the family dieting, or one person in the family exercising. I think you really have to incorporate the whole family and make it more of a family affair and a lifetime commitment to good diet and exercise.

## **Perspectives on Nutritional Issues of Military Women**

**DR. NANCY KING**

Finding out how well military rations meet the nutritional requirement of military women was one of my projects in 1991, when I was working at the United States Army Research Institute of Environmental Medicine in Natick, Massachusetts under the direction of Colonel Wayne Askew.

I found that only a small number of women had participated in military nutritional surveys, and that there had not been a survey specifically designed to assess how the military rations address the requirements of the military women.

Between 1980 and 1990, there were only 229 female soldiers that participated in five military nutritional surveys. Then in 1993, the first study designed specifically to determine the nutritional intake of female soldiers was done in Fort Jackson, South Carolina.

The data I will present to you today comes from these six studies. I will describe each study and summarize the nutritional intake of the female soldiers. Since each study was conducted in different settings and different military rations were used, and also different data collection methods were used, what I will do is compare the women's mean nutritional intake with their military recommended dietary allowance, the MRDA.

The MRDAs are established jointly by all military services in concurrence with the Food and Nutrition Board of the National Research Council. We are currently in the process of obtaining the MRDAs using the 1989 RDA. The increase in some of the nutrients is based on increasing energy requirement for the military women.

The 1980 West Point study was a five-day dining hall study. Of 190 officer candidates who participated, 54 were women with a mean age of 20 years. This study used the A-ration, which consists of perishable foods prepared just as in a regular cafeteria or restaurant operation. All the dining hall studies that I am going to report served A-rations. The data collection used in West Point in 1980 was food dairies and interviews.

The Hawaii study was a field study, 44 consecutive days. Of 240 participants, 40 were women with a mean age of 23 years. The ration used was three meal ready to eats, or MREs, for the first three days, and one tray pack and two MREs from day four through 44. The MRE is an individual packed meal used when the mission and tactical scenario do not permit group feeding. The components of the ration are processed in pouches. The soldiers in this study received one MRE each for breakfast, lunch and dinner during the first three days of the study.

The tray pack or T-ration is used when neither cooking nor preparation are possible. The components of the T-ration are thermally processed, shelf stable foods packed in field half-sized in table containers. The ration is ready to heat and serve. It is used in group settings. From day four through 44 in this study, the soldiers received one

T-ration for lunch, while continuing to receive one MRE for breakfast and one MRE for dinner.

The data collection for the MREs was used in a diet log, in which the soldiers indicated the amount of the ration component that they ate. The data collection for the T-rations used the individual estimation method, in which the soldier presents her tray to the data collector before and after the meal, and the data collector records the kind and amount of foods that the soldier had, comparing it to a pre-weighed food standard that is used as models.

The 1988 Fort Jackson study was a seven-day, non-consecutive dining hall study of 81 basic trainees. Forty were women, with a mean age of 20 years. The ration here was also A-ration, and some MREs during a field training exercise. The data collection was visual estimation for the A-ration and diet logs for the MREs.

The 1990 West Point study was a seven-day dining hall study of 205 officer candidates; 86 were women with a mean age of 20 years. The ration used was A-ration, and the data collection was records and interviews.

The Bolivia study was a 15-day altitude field study, almost 11,000 feet above sea level. Of 80 participants, 13 were women, with a mean age of 24 years. Most of them were medical personnel and engineers. The rations in this study was B-ration for breakfast and dinner and MRE for lunch, together with a carbohydrate supplement, which was given because one of the objectives of the study was to assess the effectiveness of the high-carbohydrate supplemental pack in performance at altitude. Some of the soldiers received the carbohydrate supplement and some didn't. All the female soldiers that participate in the study received this carbohydrate supplement.

The B-ration is used when cooking but no refrigeration equipment is available. Its components is mostly canned and dehydrated foods, and the B-ration is centrally prepared by the cooks and served in group situations.

The 1993 Fort Jackson study was the first study designed to specifically assess the nutritional intake of female soldiers as part of a larger study. Forty-nine 49 women participated, mean age 21 years. The A-ration was served, and the data collection was the visual estimation method.

The adequacy of their intake was assessed using the MRDA. For those nutrients that have a range for the MRDA, like energy, calcium and phosphorus, the mean point was used for these calculations. The maximum was exceeded for nutrient storage as fat, cholesterol and sodium. You can see that most of the deficiencies were in the field studies. In the field studies, the energy requirement did not satisfy the MRDAs of 2000 and 2800 calories per day.

On the protein, once again, the field studies did not meet the requirement of the 80 grams MRDA for the protein. Calcium in the two field studies and one of the dining hall studies did not meet the requirement of between 800 and 1200 milligrams of calcium. For iron, the two fields studies and two of the dining hall studies did not meet the requirement of 18 milligrams.

Vitamin B6 was reported only on three of the studies. Two of them had an intake lower than the two milligrams that is the MRDA. The folic acid intake was reported only on four studies, of which three of them did not meet the 400 microgram requirement.

Even though the mean nutrient intake in the dining hall studies was marginal at worst, some soldiers had mean intakes of less than 60 percent of the MRDA, which could put them at a nutritional risk.

Looking at the selected levels of MRDA, and this is a table from the Fort Jackson study, we can see that there were a lot of soldiers whose intake was less than 70 percent of the MRDA. This is particularly true for calcium, shown here in white. Thirty-one out of 49 soldiers had an intake of calcium less than 70 percent of the MRDA.

We looked at the menu, thinking maybe the menu did not provide them what they needed. The mean nutritional analysis indicated that the nutritional content of the menu was adequate for all nutrients.

The two main reasons given in the 1993 Fort Jackson study for not eating more were not being hungry and being too full, suggesting that females may not be able to eat as much as they require to meet the requirements. Other factors such as field conditions, extreme environments like the high altitude in Bolivia, the stress of training and/or the type of military rations served may also have an impact on the intake of female personnel.

The energy intake in the dining hall studies was adequate, so this suggests that the nutrient density of the menu, and that is the amount of nutrient per 1,000 calories, played a significant role on the low intakes that we see.

The low nutrient intakes reported in the field studies are similar to the intakes reported in national surveys of the U.S. general population ages 20 to 29. This suggests that the nutritional problems encountered by military women may not be different than what their civilian counterpart faces. However, the nutritional problem of military women may be exacerbated by the physical performance demands imposed by military training and also by the need to meet energy by height and body fat standards. To comply with the weight standards, food intake is often voluntarily restricted, potentially endangering the nutritional status and possibly having a negative impact on performance.

Most military women will not consume enough food, especially in the field situation, to meet their calcium, iron, Vitamin B6 and folic acid requirements. Although the impact of sporadic low nutrient intakes during a 10 to 14 day field training exercise may be of no consequence, this may not be the case when this intake occurs routinely or for extended periods, like during military conflict. It appears that the potential for nutritional deficiencies among military women exists and further research is needed.

Some of this research has been conducted at the United States Army Research Institute of Environmental Medicine, USARIEM, by Captain Pusitari and Lt. Colonel Klein. They are conducting studies to evaluate iron status and physical performance of women as they enter the Army.

Because military personnel pick and choose the meal components that they eat based on their food preferences, nutritional surveys of actual food consumption are

crucial to determine the food intake and to assess the nutritional status of women. Serving an adequate menu does not necessarily mean that an adequate diet is consumed. Nutrition education is very important to motivate military personnel and their families to select diets and adopt eating habits consistent with the current knowledge relative to healthy eating practices. The implementation of nutrition education programs tailored to the military women is crucial.

The program needs to feature the importance of eating nutritionally balanced and varied types, emphasizing the relevance of dietary calcium, iron and folic acid on female health. The program has to have easy how-to guidelines to assist the military women in the selection of low-fat nutrient-rich foods, so that they can have better health.

More research is needed to ascertain the short-and long-term effects of this sporadic and routine sub-optimal intake on the nutritional status, health and performance of military women. Considering that approximately 54 percent of the women in the U.S. Army are older than 25 years of age, particular emphasis should be given to include older military women in future studies.

Before closing, I would like to recognize the five principal investigators of the five studies I presented and their colleagues, who collected, analyzed and published most of the data. Dr. Cresh, Colonel Schankenberg, Mr. Rose, Lt. Colonel Edwards and Mr. German.

## **Nutrition and Health in Military Women**

**DR. BERNADETTE MARRIOTT**

Nutrition and health for military women is a very, very broad topic. I would like to begin with several aspects of life span nutrition that are particularly important for military women. The views that I am going to present today are based on activities of the Committee on Military Nutrition Research of the Food and Nutrition Board at the National Academy of Sciences, and programs that are related to the recommended dietary allowances, as well as current NIH activities that I am involved in.

The background material are based on the initial report that generated the basis for this workshop, Recommendations for Research on the Health of Military Women, FNB reports and RDAs, nutrition during various lifestyles and reports of the IOM Committee on Military Nutrition, and various journal publications.

I would like to begin by just mentioning a few points that I expect you have heard earlier in this workshop. There are 350,000 military women, including active duty and reservists with a very interesting age distribution. Ninety-one thousand, almost 92,000 of the active duty women, or almost 50 percent, are less than 25 years of age.

There is a relatively small proportion that are over 40 years of age, or about 5.6 percent. This is just active duty women. I'm not neglecting those reservists; I just didn't happen to be able to find those figures in the books I had available to me. And forty percent belong to one or another minority group.

Some additional points. Twelve point eight percent are officers and 12.5 percent are enlisted. I think this is quite remarkable. This goes across the various services, and gives a very good representation in the officer ranks.

In terms of job occupations, 43 percent are in health care and supply administration, through the dominant occupations. But all military women must experience the rigors of basic training, and of course must be ready at any time to potentially face deployment and related physical and emotional stressors.

Four percent of living veterans are women. The number of women veterans will increase by 17 percent by around the year 2000, while the number of male veterans will be on the decline. Six hundred and thirteen thousand women veterans were in the labor force in the 1990 census. In 1994, 36,000 women left the services, left active duty. So in terms of the overall work force and in terms of veterans, women veterans, we are seeing a very different change in the population.

When we think of health of women in the military, we can no longer just think about women in a certain age group. We need to think about women across the life span, because activities and diet and stressors that women face during active duty life are going to have a strong impact on them as veterans as well, and in their later life, both in terms of health and in terms of life span approach to problems.

As an example, in a study done by Dr. Rudman in a veterans nursing home. The



percentage of women residents with less than 75 percent of the RDA was 100 for copper, 91 percent for manganese, and 37 percent for calcium. When we think about the impact of some of these nutrients, particularly calcium and magnesium, on a person's ability to be ambulatory, then we need to also think of people that are facing this situation as veterans, women in a nursing home. We need to be particularly concerned about women earlier in life.

A major recommendation from the report was for research on the nutritional status--including information relevant to life cycle stage, military status and job category--of women in the military as well as on the factors that influence the consumption of field rations and fluids. Another major focus for research in women in the military should be nutrient and food requirements for optimum performance. Now, some of these recommendations have been moved forward both within the military and through extramural funding programs.

Physical fitness and mental health and attitude are a particularly important area. We lack a lot of information about this is one of these areas that is particularly of importance, and as Melinda mentioned, there is a tremendous amount of information that we lack on physical fitness and mental health in the general public and we also have very little information at all on military women.

Another overarching recommendation was that women's nutrition, physical fitness and gynecological, reproductive and psychological health must be studied in relation to their effects on performance of military responsibilities because nutritional status, can have significant effects on performance. Studies of female athletes showed diminished capacity in women with low energy intakes, as Melinda mentioned, and/or deficiencies of such nutrients as iron and calcium, as Nancy highlighted.

I would like to talk about iron and calcium. Recently the Committee on Military Nutrition Research at the Institute of Medicine was asked by the Army to look at studies regarding iron status in military women. They published the report in December of 1995. The Committee on Military Nutrition recommended that there be specific intervention studies with women in basic combat training to identify specific cognitive and physical performance deficits. As Nancy showed in her studies, there appear to be deficits in iron. But these need to be tied to specific cognitive and physical performance problems, so we can begin to identify where in the system the problems lie. Is it just when women are in the field, or are we also seeing this with the women in the dining hall?

Much of the data that we have is conflicted because of peoples' definitions of iron deficiency. Several models have been developed in relation to the NHANES-3 studies, and the IOM review recommended that the existing data be reviewed again in detail in the context of these models, specifically to develop a screening program for military women that would look at their iron status during different phases, not just in basic training, but sporadically and also periodically and to develop a regular program for screening for iron deficiency.

I would like to focus for the rest of my presentation is on calcium. In one of



Melinda's studies, she indicated that women 18 to 30 years of age have calcium intakes of 787 milligrams of calcium per day. That is very, very low, 42 percent of the RDA. These are active women. In Nancy's study you saw that calcium was one of the problem areas that kept showing up again and again in terms of the intake of military women.

Ninety-one percent of bone has been acquired by the age of 17, and 97 percent by the age of 26. Almost 50 percent of military women are less than 30 years of age. The bulk of women in the military today are still in this critical age of building what is going to be their individual bone mass for their entire life. Bone gain between the ages of 20 and 30 in college women was influenced by the calcium intake, the protein intake and the physical activity, in a recent study by Recker. Specifically here, it was shown that calcium and protein intake were as influential as physical activity, in terms of laying down additional bone in this critical time period.

Women can gain 12.5 percent of their total bone mass between the ages of 20 and 30. The determinants of bone mass are 80 percent endogenous, composed of genetic and hormonal factors, and about 20 percent environmental, mainly nutrition and exercise.

Variations in calcium nutrition during adolescence may account for five to 10 percent of the difference in peak adult bone mass. That doesn't seem like very much. However, this small difference contributes more than 50 percent of the hip fracture rate in later life. While we are talking about a relatively small factor here, 20 percent, and in terms of later adolescence five to 10 percent of peak adult bone mass, we are really talking about a major effect in terms of cost, both financial and to the well-being of women later in life.

Let's look a little bit at some of the calcium interactions, because calcium is in a nutrient class of its own. Caffeine has a really relatively small effect on calcium balance. One cup of freshly-brewed coffee equals a decrease in calcium balance of only about two to three milligrams. This effect can easily be offset by one to two tablespoons of milk.

Aluminum in the form of antacids can however have a very significant effect. Aluminum in antacid tablets can elevate urine calcium by 50 milligrams a day in people that are taking these on a regular basis. Often, women in particular due to stress in their lives and other activities become chronic takers of antacid tablets. This can be very detrimental in terms of their calcium, because it binds phosphate in the gut and elevates the calcium loss through the urine.

Fiber has quite a variable effect, but mostly it is relatively small. Some examples are that wheat bran reduces calcium absorption, fitate in beans also can reduce absorption of the calcium from beans, and oxalates in spinach and rhubarb make the calcium in these two foods practically non-available. Phosphorus has very little effect across the wide dose ranges. Phosphorus used to be considered as a major player in terms of overall calcium nutrition. What we are finding now is that it is not as major of a player as it used to be thought. Vitamin D, Vitamin D enhances the intestinal efficiency in absorbing calcium, and deficiency does result in transient hypocalcemia. We are looking at 200 to 600 international units a day. Five to ten minutes of sun exposure is sufficient for most

healthy adults in order to have an effective level of Vitamin D, in terms of Vitamin D and calcium interactions. In fact, it is now recommended for the elderly who are more at risk for Vitamin D deficiency that they consider, particularly in long cold days of the winter, when their Vitamin D may become a limiting factor, having five minutes of sun exposure before they apply sun block, and that this would actually raise their level of Vitamin D sufficiently to help bring them back into balance. This is from a very recent study that was conducted at the National Institutes of Health, and recommendations of Bob Haney.

Protein and sodium effects, however, can be very major. This is of concern, particularly in terms of military women. Both increase urinary loss across the range of intakes. One fast-food hamburger is equivalent to the increment in urinary calcium of 28 milligrams, or a negative balance of 23 milligrams.

Bob Haney in 1994 said that differences in protein and sodium intakes from one nation to another nation are part of the explanation of why studies in different countries show different calcium requirements. At low calcium and protein intakes, the calcium requirement for women may be as little as 450 milligrams per day, whereas when intakes of protein and sodium are very high, we may require as much as 2,000 milligrams per day. The intake of protein and sodium have a major effect on the need for calcium in an individual.

I wanted to mention here some risk factor prevalences among women, in terms of long-term health. Smoking, cholesterol, blood pressure and obesity are some of the major risk factors for long-term health in terms of the NHLBI in survival in women. The leading causes of death as a proportion of all deaths among women in 1991: 44 percent were cardiovascular disease, cancer was a poor second, and others at 19 percent. If we look at influenza, it was only four percent, pulmonary, accidents and diabetes are all in the range of three to four percent.

In terms of cardiovascular disease, we are looking at heart disease at 76 percent, cerebrovascular disease is 18 percent, and other CVDs is six percent. What does this have to do with calcium? At the recent calcium consensus conference and several other reports, evidence strongly suggests a beneficial effect for dietary calcium in the prevention of hypertension, which is a major risk factor for cardiovascular disease in women, the major cause of death. This is a conclusion that is consistent with that reached by the Joint National Committee on Hypertension in 1984, 1988 and 1993, and it was a summary of the LSRO report that was presented in 1993. So not only are we seeing that calcium plays an important role in bone health, but also, it is very important in terms of survival in cardiovascular disease.

Where we are in terms of calcium intakes? The median intakes values consumed by 50 percent of the group for the national health and nutrition examination survey, the NHANES-3, suggest that a large percentage of the U.S. population may not be obtaining the RDA for calcium. The most recent NHANES results continue to support this finding. Mean calcium intake decreased from 907 milligrams to 728 milligrams in military women in the studies that Nancy presented from 1988 to 1993 in the Fort Jackson study.

We are seeing that parallel as Nancy mentioned to the population as a whole.

What about sodium intakes? We know that sodium and calcium are important interactors. Mean sodium intakes exceeded the minimum recommended intake of 2,400 milligrams in the NHANES-3. In late adolescence, the period of the bulk of military women, the population as a whole had quite a high sodium intake. In the Fort Jackson studies, sodium intakes of military women in basic combat training decreased from 1988 to 1993, but while they were within the MRDAs, they were not below the U.S. dietary guidelines.

What about protein intakes, another interactor with calcium? Mean protein intakes of women in the U.S. were similar across race and ethnic groups, with 63 to 66 grams, again from the NHANES-3 study. Mean protein intake declined in military women in basic training from 96 to 82 grams. Still, it is 102 percent of the MRDA, and 164 percent of the RDA. So protein, which can lead to loss of calcium, is also very high in military women, protein intake.

Calcium and exercise is an issue discussed at a meeting two weeks ago at the National Institutes of Health to look at dietary supplements, nutrients and physical activity. One of the areas that was quite surprising to me Connie Weaver's presentation on the calcium issue in terms of exercise.

She found that the data is not very clear, and many of the studies are contradictory. As an example, one positive study was an eight-month weight training study, where we looked at weight training or jogging in pre-menopausal women. They saw a positive effect of these two training exercises on calcium balance and bone accretion. Similarly in one other study, there was a positive effect of 18 months of resistance training in 56 women, again in the young age group, and they were taking in a relatively high level of calcium of 1500 milligrams per day. The increase was seen on bone mineral density.

However, many of the other studies have not been as conclusive. So these are just a few studies that do show positive information. What do we know about weight cycling with variable exercise and military women being very active while they are out in the field, then coming back into a much more sedentary lifestyle, going out into the field again, coming back again? What do we know about this type of exercise pattern, and how it relates to calcium, bone and lifetime health in military women? We know very little.

I would like to mention the question of the MRDAs and the RDAs. The Committee on Military and Nutrition Research was asked to review the MRDAs in relation to the RDAs. The military recommended dietary allowances, as Nancy mentioned, as based on the RDAs that are set by the Food and Nutrition Board, based on current understanding and knowledge of dietary requirements, and now with the new RDAs in development, to promote life span health. The Committee on Military Nutrition looked very closely at the MRDAs and presented the recommendations at the end of 1995.

One of their major recommendations was that the services review whether there continues to be a need to maintain separate MRDAs in light of existing information that has been developed by the IOM, DHSS and other organizations for the general population. Again I am paraphrasing from the report; the MRDAs assume additional energy requirements for military women and also different requirements for environmental extremes in amounts to insure a palatable diet. MRDAs assume that military personnel differ significantly from the American population in terms of age, fitness, body composition and activity. The Committee on Military Nutrition Research at the IOM, now questions whether the military population in the 1990s really does vary significantly from the American population in ways that would not be addressed within the framework of the dietary guidelines, and within the revised RDAs. They recommend that the military look carefully at the MRDAs, and look carefully at the MRDAs as a standard across which to measure their foods, their rations, and the performance of their soldiers.

In terms of research in particular, and in terms of where we should focus in terms of military research, I think we can say that calcium has emerged as a critical nutrient for life span health, particularly in women and specifically in military women. While increased calcium intake appears important, the recommended amount varies from 800 from the RDAs to 2,000 from scientists working with adolescents in the field, and also working with adolescents and young adults who are exercising. The calcium consensus conference fell right in the middle here, at 1500 for young adults.

The interactions of calcium with other dietary constituents are very complex, and we are just beginning to understand them. The committee recommends long-term commitment to women's health. Research findings could be of direct benefit, not only to the DoD, but to American women at large. If we can look at these interacting factors, protein, calcium and activity, and we use the American military population as a very good model for young active women, we would be able to go far in terms of our understanding of these very complex processes that have life span health implications, not only for veterans, but also for all women.

## **Exercise, Conditioning and Fitness as They Relateto Injury in Active Duty Women**

CDR. JOSEPH MOORE

I hope to concentrate today on musculoskeletal injury as it relates to the active duty female. Particularly we are going to look at the injury rates in females, which are higher than they are in males, and look into the types of injuries that the female active duty Marine population has. Then I'll go into the factors that put the female at risk for injury, not only the extrinsic factors--those environmental factors that we can sometimes control--but some intrinsic factors as well as behavioral factors that contribute to injury. Finally, I would like to finish up with a note on these opportunities to improve in all of these areas.

There is a limited amount of data out there on the civilian population and a lot of control factors. We can't control in the civilian sector what that athlete does in her off time, whereas we can obviously in the training environment.

There are not good measures for fitness over large population groups in the civilian sector. As a result, the risk factors that you would expect to see or hope to see from that population can't be deciphered as easily as you can from the military population. Conversely, in our military population, physical fitness is readiness. How you act, how you look in a uniform, what you do on a day-to-day basis are judged daily. It is on your fitness report. There have been numerous studies dating back into the early 1970s concerning injuries in females. More recent studies that have come into print are very good. They look at incidence and types of injuries, and risk factors for training.

Physical fitness has several components. The biggest is cardiorespiratory or cardiovascular fitness. Probably the biggest correlate with injury is the level of cardiovascular or aerobic fitness. There is a direct correlation between that and the amount of injury that you can expect to receive in the training environment. Flexibility, strength, endurance and power--a component of strength as it relates to speed--agility and specific tasks are also components. We haven't looked at this area very much in terms of research on what jobs people actually do. But when you look at the elite athlete, we get that person back to a specific activity. If he or she is a sprinter, we have got to get him or her out of the blocks.

I want you to think as we go through this talk today about the specific job that the female does in the performance of her duties, rather than how much strength she has compared to a male, or their relative injury rates.

I will just mention flexibility. There are a lot of proponents for flexibility, and also a lot of people who think flexibility doesn't have anything to do with physical fitness. However, if you have an injury, the number-one thing that we have to do is get that stiffness out of your ankle sprain, for instance. As long as you are inflexible, or if you come into the military with flexibility problems, you are at a higher risk for injury.

When you look at the various military training programs, most of the data comes from the Army and the Navy. Navy and Air Force usually less intense than Marine Corps and Army. There is variance in the duration and frequency of training. Boot camp for Marines is 12 weeks, for naval training at that recruit training center at Great Lakes is eight weeks, Army is 12 weeks basic training. The injury rates that you will see reported here have a broad range also, anywhere from an incidence of 16 percent up to approximating 70 percent of injury.

Several factors contribute to that broad range. One is reporting practices. If you take all the stress fractures that come into the naval hospital for treatment and report those, your incidence of stress fracture rate is much lower than is actually occurring in the field. Or if the criteria for diagnosis of a certain injury differ between the groups, you will see variances in the incidents for those types of injuries.

One of the areas that hasn't been studied well is lost training days. There is a lot in the literature about incidence of injury, but there is not a lot on how long this person took to get back to his or her duty. There is no good comparisons between how long it takes a male to get back to duty and how long it takes a female to get back to duty for a similar injury. Attrition rate also is significant. The baby boom has passed through, and the attrition rates that we have had in the past in training oftentimes can't be tolerated.

In general, the highest rates of injury occur in the first three weeks of training. What types and patterns of injuries do we see? There are several broad categories, with most falling into the overuse category, including stress fractures. The acute or traumatic injuries account for about 20 percent, 20 to 30 percent, depending on the study that you look at. The overuse injury accounts for approximately 80 percent, and then others account for the remaining musculoskeletal injuries. This says that our training is safe, that very few people have catastrophic, career-ending injury. Most of the attrition and most of the light duty and limited duty in rollback comes from overuse injuries. Bruce Jones showed that muscle strain accounted for the highest proportion of injury type, followed by a significantly high incidence of stress fracture. Sprains and tendinitis and knee overuse injury accounted for a lot of the rest. This is, as you can see, a broad category, broad brush strokes in terms of categorizing these injuries.

If we look at Navy and Marine Corps data on personnel injured during training, you will see that the SEALs has an injury rate of about 30 percent. In males at MCRD-San Diego -- where there are no females-- about 25 percent are reported. MCRD-Parris Island, again for males, reports about the same. All the training for Marine Corps enlisted occurs at MCRD-Parris Island. About 60 percent of women will report with an injury at Marine Corps training at enlisted basic.

Naval training is a little less intense and a little less lower extremity intensive. There is a lot less marching and a lot less lower extremity trauma. Of males, about 11 percent will report with percent, females, about double that. At Officer Candidate School at Quantico, which has 12-week summer courses taken between sophomore year in college, and again between junior and senior years. There are a tremendous rate of



attrition there and a tremendous report of injury. The male rate at Officer Candidate School-Quantico, is about 23 percent.

Let's see what types of injuries are occurring and the difference between males and females. At Recruit Training Center, Naval Training Center, Great Lakes, in males, the majority is tendinitis or bursitis about the knee, followed by back pain, shin splints, patella-femoral pain, pain about the anterior part of the knee, the front part of the knee, pain when you sit for a long period of time and get up, pain going up and down steps, patella-femoral pain, ankle sprains, wrist and shoulder pain, and a fairly low rate of stress fractures. The female population, same population, same training environment, on the other hand, has vastly different diagnoses. Plantar fasciitis leads the list. No report of significance shows in the male population, number-one diagnosis in the female population. Shin splints, tendinitis, bursitis, ankle sprains are down here, stress fractures higher. You will see that stress fractures in general are higher in the female population. But again, no back pain. Why isn't there any back pain in this population to speak of in these two groups? Number-two injury is back pain in the males.

Once you have an injury, have been diagnosed with a musculoskeletal injury, you have several options. Those of us in the military know what those options are. You will be profiled in the Army, or have some form of light duty. You have limited duty, which implies that you have a longer-term injury, or perhaps you have had to go to surgery, and your disposition cannot be reconciled until your medical condition has been cleared by the specialist. It implies a longer term.

You can be rolled back. You can be in some phase of your training cycle, and have an injury, and they decide to keep you, or you decide you want to stay, and you just wait for the next cycle to come through, and you go through training from the beginning.

Finally, you can leave the program. Attrition rates are high. In one study, at least a third of women in training will lose one or more training days to injury, a light-duty status. The attrition rate last year for women candidates, women Marine candidates at Quantico, was upwards of 44 percent, a very high attrition rate.

Some of the things that contribute to that are not just the type of injury or the frequency of presentation to the clinic with an injury, but the fact that they have a very short window. If they are out two to three days, it is almost certain that they will go by the wayside and have to stop the program. The program is that accelerated.

Another thing may be that getting female candidates into the Marine Corps is a very high visibility item for the recruiter. They will sometimes do and say many things to get a person on the docket from their recruiting district.

Let me spend a few minutes on stress fractures because they will stop you from training. You can't work your way through a stress fracture. If you are in a training environment, you have a much greater risk if you are a female of having a stress fracture-1.6 to 5.8 in various studies. There is an ethnic difference also, in that white females are at higher risk than African-American females, than white males, and the lowest risk is an African-American male.



Again, the rates that you will see, and they are published in the literature, range anywhere from .4 percent that you saw in the NTC data from Great Lakes, upwards of eight percent, 12 percent.

We invented stress fractures in the Army and in the armed services. Typically, they were first described in the foot, the metatarsal stress fractures. But they now occur mostly around the tibia, in areas of the proximal tibia. But if they occur in the femur, especially the femoral neck, that definitely can be a career-ender and may require surgery to have a pinning procedure or a plating procedure. Interestingly, we are seeing women in the military as well as cross-country runners in the civilian population, females, that have an increased incidence of pelvic stress fractures.

Let me shift gears here now and talk about risk factors. There are several risk factors that are exclusive to women and some that are true for the general population. There are extrinsic risk factors, some of which we can control for and some of which we can't. Those include the load carriage, how much weight you put on your body, or how much you are able to carry, training errors, and we are getting better at this, but we are not perfect yet. Environmental extremes was touched on in an earlier topic, and I won't talk about it today.

Intrinsic factors related to the human body itself include the fact that angle between the femur and the tibia in a male is pretty much zero. In a female by design, there is some angulation of the femur into tibia, and this alignment will cause an increased incidence of patella-femoral syndrome, or abnormal tracking of the kneecap.

There are levels of physical fitness we will talk about, that put you at risk if you are at a low level of physical fitness. There are ethnic relationships as well as menstrual history that was mentioned. Additionally, smoking and alcohol have a significant detrimental increase on your likelihood of getting an injury in training. Body composition also plays a part. The heaviest and the thinnest are at a higher risk for injury, and some studies say the least flexible and the most flexible of us are at higher risk for injury. There is more data that needs to be collected on both of these, and whether or not this is an independent factor here or not, or whether it relates to their conditioning, that still needs to be ferreted out.

Let's look at the cardiorespiratory fitness. This risk factor for injury is probably the strongest one we have. If you step off the bus, and we were able to test you with a one-mile run time, and we divided the results up into fourths, these people in the slowest category, the quartile three and four here, will have a higher incidence of injury in their training than those who are faster. Those who are faster have a statistically significant decrease in their report of injury than those who are slower.

**APPENDIX II:**

**REVIEW PAPERS COMMISSIONED**

**PRIOR TO MEETING**

## TABLE OF CONTENTS

	<u>Page</u>
"Selected Environmental, Chemical, Physical, and Biological Hazards for Women in the Military" Maura Emerson, M.D., M.P.H. CDR, MC, USN	1
"Health Effects of the Stressors of Extreme Environments on Military Women" Ann E. Norwood, M.D. Robert J. Ursano, M.D. Frances H. Gabbay, Ph.D.	9
"Contraceptive Needs of Women in the Military" LTC Dan Lee Gehlbach, M.D.	23
"Vaginitis/Cervitis: Diagnosis and Treatment Options in a Limited Resource Environment" Daniel V. Landers, M.D.	28
"Chronic Dieting in Active Women: What are the Health Consequences?" Melinda M. Manore, Ph.D., R.D.	36
"Patterns and Risk Factors for Exercise-Related Injuries in Women: A Military Perspective" Patricia A. Deuster, Ph.D., M.P.H. Bruce H. Jones, M.D., M.P.H. Joseph Moore, M.D.	50
"Exercise in the Prevention and Treatment of Chronic Disorders in Women" Patricia A. Deuster, Ph.D., M.P.H.	62
"The Active Duty Wife and Mother: Special Concerns for Women's Health" Christine K. Wahl, Ph.D.(C)	76

## **Selected Environmental Chemical, Physical, and Biological Hazards for Women in the Military**

Maura Emerson, M.D., M.P.H.  
CDR, MC, USN

### **Physical Hazards**

#### **1. Weight-bearing and Lifting**

Women do not have equal lifting strength in comparison to men, however, if job tasks can be tailored to the individual's physical capacity and coupled to equipment design changes task completion is usually unaffected. The stress induced at the low back during lifting activities is a combination of the actual load and the method of lift. Within the civilian community, the occupational approach to prevention of back injury has combined industrial design changes with employee education regarding safe lifting techniques (1). The expectation is that both work related back pain and lost work days caused by work related back pain will decline.

Several studies have documented a higher incidence of stress fractures for women in basic training (2, 3, 4). When compared to men undergoing identical training, 10-12% of women experience stress fractures of the lower extremity while only 1-3% of men have similar injuries. Fracture risk is determined by both bone strength and actual stress applied to the bone. Bone strength is dependent upon bone size and bone density. A recent civilian study (5) reported a vertebral bone size 25% smaller for women with no difference in vertebral bone density. An accompanying commentary (6) suggests that although the gender specific smaller bone size might appear to impart a greater risk of fracture for women, the reduced lift capacity of women modifies the bone stress. As long as the limits of lift capacity are not exceeded, women would have no greater risk of fracture than men. However, under the demands of basic training, women may be operating closer to capacity than men.

Another recent study of 2312 active duty US Army women (7) reported a lifetime prevalence of 16.1% for stress fractures. Also noted was a significant association of a history of stress fracture and being a current smoker, having a history of amenorrhea, or having a family history of osteoporosis. Each of these factors have been associated with decreased bone density as well as a subsequent enhanced risk of osteoporosis. Eleven percent of those reporting a history of stress fracture also reported having experienced debilitating bone pain during basic training that caused them to interrupt physical training. The leg was the most common site of reported stress fractures.

The association of smoking with a lifetime prevalence of stress fracture is likely due to a nicotine related increase in hepatic metabolism and subsequent increased clearance of estrogen. The resulting decrease in estrogen levels has previously been associated with a decreased bone density in smokers (8). There has been concern that women in the military had a higher

prevalence of smoking than did women in the civilian community. The prevalence of smoking among active duty military women from 1980-1992 was reported to be not only higher than active duty men, but also higher than that of either gender in the civilian population (9). Within the military veteran population, a survey of 409 female veterans reported 32.5% to be current smokers with 67% of those persons smoking a pack of cigarettes per day. More than a third of female veterans who had ever smoked began smoking while serving in the military. However, the 1995 Department of Defense Survey of Health Related Behaviors Among Military Personnel reported that a comparison of all rates of smoking for both military and civilian populations showed no significant difference. Women military personnel smoking rates were also comparable to rates for civilian women with the single exception of young female marines. After standardizing civilian data to military data by sex, age, ethnicity, education, and marital status, women in the US Marine Corps who were 18-25 years old had a 35.4% lifetime prevalence of smoking while comparable civilian women had a 28.6% lifetime prevalence (11). The health hazards of smoking are extensive, however, the additional effect of smoking on bone density and risk of fracture in demanding physical training situations may be synergistic for military women.

Other factors have also been linked to exercise related injuries among women in the military as they enter basic training (12). A study of intrinsic risk factors for exercise related injuries among Army trainees reported an association between two individual factors and subsequent development of an exercise related injury. These factors were performance on the initial physical training test mile run and height of the individual. Taller women with better baseline aerobic fitness, as measured at entry to basic training, had less risk of an exercise related injury during training. This study suggests that gender is not an independent risk factor for exercise related injury. Baseline aerobic fitness level may actually be the most important risk factor for injury. Furthermore, while height is not subject to change, baseline fitness level at entry into training should be a modifiable risk factor.

## **2. Extremes of Temperature**

The military importance of an effective plan for treatment of medically related problems in the cold environment was reviewed in 1987 (13). This review recognized the need to identify certain racial or ethnic groups with an inherent increased risk of cold injury. Gender differences in physiological response to cold exposure have been reported. To the degree to which such differences impart an increased risk of cold injury, an effective prevention program must acknowledge these differences.

Differences in thermal, metabolic, and cardiovascular response to cold stress have been reported as gender associated (14). Rectal probe temperature measurements of individuals immersed in cold water at rest reported more rapid cooling for women. In spite of a more rapid cooling, these women did not demonstrate an increased metabolic response. When forced to exercise at a given metabolic rate while immersed in cold water, no gender differences were detected in metabolic response. However, if women are allowed to determine their own exercise pace or metabolic response, the gender difference in metabolic response to cold water immersion was seen in a study of Japanese divers (15). Although immersed in cold water at the same time

as the male divers, the female divers did not demonstrate a metabolic response to the cold stress until their rectal temperature had declined one degree Celsius more than their male counterparts. The important question to be answered is whether this apparent delayed sensitivity to cold imparts an increased risk of cold injury for women.

Exposure to cold air is a more common exposure for the general military population. Gender differences in metabolic response following various cold air stresses have also been reported. Women have lower mean skin temperatures while at rest in cold temperatures and do not demonstrate an increased cardiac stroke volume with accompanying decreased heart rate documented for men exposed to cold stress (16). However, and possibly most importantly, there were no differences in peripheral blood flow and women are not reported to be more susceptible to frostbite injury. Yet, cold pressor stimulus studies suggest a possible gender difference in alpha adrenergic sensitivity mediating the different female response to cold (17). In the extremes of environment possibly encountered by a woman in the military, would this inherent difference imply a significant increased susceptibility to cold injury?

Currently, there are no gender specific categories within the cold weather training guidelines utilized by the US Army worldwide. Nor were gender differences reported in a summary of US Marine Corps cold weather research (17). Currently, research is in progress at the US Army Research Institute of Environmental Medicine in Natick, Massachusetts, to develop a thermoregulatory model specific for women exposed to cold stress or heat stress while wearing military clothing (18). Results from this study should provide some guidance for determining whether gender specific precautions should be included within future cold injury prevention programs.

Although a topic of controversy for some time, there appears to be no gender specific difference in heat tolerance if populations are age matched for  $\text{Vo}_{2\text{max}}$  (19). However, military personnel conducting training exercises in heat and humidity are at increased risk for heat injury. It is important to collect data regarding the gender specific occurrence of such injury. During Desert Storm, a survey of 148 military personnel scheduled to redeploy to the United States was purported to determine the effectiveness of an enforced water discipline policy and baseline physical fitness as preventive measures against heat injuries. Gender was not reported in this study (20). Another recent report of the effects of heat-exercise stress, NBC clothing, and pyridostigmine treatment on performance had a study population of 8 male volunteers (21). Even a report evaluating the use of a commercial device, the Botsball, to evaluate environmental heat stress for use with established training guidelines failed to provide data on the gender of the identified heat casualties (22).

While gender may not be a risk factor for heat intolerance itself, other variables associated with gender may increase the metabolic energy expenditure involved with performance of a given task while exposed to heat stress conditions. A Canadian civilian study of women workers in an industrial laundry addressed that issue. Investigating the self reported discomfort and metabolic response of these workers to task performance in winter versus

summer months, the authors reported that the ambient temperature at all times was well below the occupational exposure limit for the "light work" category appropriate for their tasks. Yet workers reported discomfort and mental as well as physical fatigue at significantly higher rates in the summer. Furthermore, while workers were also always able to maintain a safe body temperature through sweating and efficient peripheral blood distribution, their cardiac strain as reflected by increased heart rate exceeded occupational exposure standards for "light work" by 2-3 fold. The finding of increased cardiac strain even during the winter months suggested to those authors that "light work" by male standards may not be equally light for female workers performing the same tasks (23).

The military cannot predict operational environmental conditions, nor can the mission be delayed until improved environmental conditions prevail. However, an awareness of those persons at increased risk for heat or cold injury can improve surveillance to enable early identification of those afflicted. In the meantime, it is important to continue to collect incidence and prevalence data that include gender as a variable for analysis.

## **Chemical Hazards**

### **1. Nerve Agent Pretreatment**

The military operational environment may carry a risk of exposure to chemical warfare that includes nerve agents. In order to minimize this risk of exposure, the US Armed Forces now employs a regimen that includes pretreatment with pyridostigmine bromide initiated prior to nerve agent exposure. If exposure occurs, auto injection of atropine citrate and pralidoxime chloride is indicated. Operation Desert Storm was the initial large scale adoption of this regimen. Side effects of this agent are related to its cholinergic properties. Of 41,650 soldiers of the XVIII Airborne Corps, only 6.5% were women. A retrospective study of the 483 members who sought medical treatment for side effects of pyridostigmine bromide was conducted (24). While the majority of complaints were minor gastrointestinal disturbances that were not incapacitating, there were two anecdotal reports of mild cholinergic crisis type symptoms occurring in two women with body weights of 45-50 kg. Other than these cases, no gender specific analysis nor data were reported. Although the response of the women who experienced a possible mild cholinergic crisis in response to the prescribed dosage of pyridostigmine bromide was likely related to total body weight and not an inherent gender difference in sensitivity, further investigation into possible dose modifications based on body weight is being conducted.

When prophylaxis with pyridostigmine is provided to a population also at risk for combat injury, it is important to consider treatment implications and possible drug interactions. A comprehensive review of possible interactions between common drugs included in the Defense Medical Standardization Board and Deployable Medical Systems D Day Item lists and pyridostigmine was published (25). No gender specific considerations were reported.



## **2. Pesticides and Herbicides**

Historically, concern for the potential carcinogenic and reproductive hazards imparted by exposure to pesticides and herbicides has been considerable. The Viet Nam War experience of military personnel exposed to Agent Orange (dioxin), was highly publicized as being associated with catastrophic health outcomes. Yet, the veterans currently being followed in a 20 year prospective study, The Air Force Health Study, include only men (26). A single study of women who were veterans of the Viet Nam War reported an increased death rate for the category of motor vehicle accidents only (27). Among Viet Nam female veterans who were nurses, there was an significant increase in reports of cancer of the pancreas and uterine corpus, but specific exposures are uncertain.

During the Persian Gulf War, pesticides were applied as needed following an area survey to determine the presence and abundance of target vectors or nuisance species. Agents utilized for local application were registered with the Environmental Protection Agency (EPA) and applied by trained personnel who were certified pesticide applicators under a plan approved by the EPA within the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). There were no pesticide related poisonings during Desert Shield or Desert Storm (28). Post conflict review by the General Accounting Office (GAO) (29), continued to express concerns regarding the application of EPA standards for safety and efficacy to operational war time conditions, as well as possible reproductive hazards dependent upon actual exposure. No application records were kept for pesticides used during the Operations Desert Shield and Desert Storm (28), therefore, it was impossible to determine actual personnel exposure and risk, if any (29).

## **Biological Hazards**

### **1. Infectious Diseases**

Gender does not usually impart an increased risk of enhanced susceptibility to infectious disease. However, if one is employed in a predominantly female occupation with an increased risk of exposure to infectious agents, increased rates of disease are not uncommon. An example of this scenario might be the historical incidence of Hepatitis B in nurses. This incidence was a reflection of enhanced exposure to blood products and/or body fluids rather than an inherent susceptibility of women to the hepatitis virus.

A recent report of a national serosurvey of US Army recruits described differences in seronegativity for vaccine preventable diseases by gender (30). Males were more likely to be seronegative than females for measles, rubella, mumps, and poliovirus. Varicella susceptibility was greater for females than males. The report suggests that serological status of the young adult population is a reflection of multiple factors including childhood exposure to natural infection, compliance with recommended immunization schedules, primary vaccine failures, and waning vaccine immunity with age. Mandatory screening and immunization recommendations for all members of the military population should detect susceptibles and reduce the incidence of vaccine preventable disease regardless of gender.

## 2. Immunization

Again, gender is not associated with an increased risk of side effects associated with immunization. However, the possibility of pregnancy must always be considered when caring for women of reproductive age. Pregnancy is a contraindication for most live virus vaccines. It is important to recognize that if the risk of exposure is great than pregnant women can receive yellow fever or polio vaccines (31). It is also important to recognize the risk of neonatal tetanus, especially in some developing countries. Pregnant women can be given combined tetanus-diphtheria toxoid (31). Although the operational deployment of pregnant women is restricted, it is possible that a woman may not be aware of her pregnancy until after she has deployed. Worldwide deployability of military women carries an enhanced risk of exposure to several diseases not endemic to the United States. Voluntary screening for pregnancy is offered during predeployment medical screening.

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## **Health Effects of the Stressors of Extreme Environments on Military Women**

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### **EXTREME ENVIRONMENTS**

Military service entails a host of stressors, generic and unique. While war is perhaps the most visible extreme environment, service members are exposed to unique sets of physical agents, toxic hazards, and exposures (Hoiberg & White, 1992) during peace and war, whether serving aboard ship, flying in high-altitude aircraft, or riding in an armored personnel carrier. Particular occupations within the military, by nature of their tasks, pose high psychological and physical threat to workers: aviation, space flight, body retrieval, explosive ordinance, to name but a few. At times, it is not the occupation, per se, that is the source of risk but rather where the service is plied. For example, harsh environments such as tropical or arctic climates have been shown to increase combat stress casualties [probably through the addition of physiological stressors to the usual psychological stressors of combat (Gal & Jones, 1995).] One of the additional environmental stressors faced by women in the military may be the stress associated with being a minority in an organization which is predominantly male (Hoiberg & White, 1992). The relationship between external stressors (such as extreme environments) and health is currently a focus of great interest in the civilian and military research communities.

### **STRESS AND COPING**

As will be discussed, the ways in which individuals experience an environmental stressor may have profound implications for their psychological and physical health. Stress is often defined as the physiological and/or psychological response an individual makes to an external event (stressor.) Appraisal is a key concept in considering ways in which women might have different outcomes from stress than men. Appraisal is the term applied to a dynamic process of evaluating the stressor and comparing it with one's resource inventory. A person experiences psychological stress only when he has made an appraisal that the stressor challenges or exceeds his resources. Challenge, the alternative response to a stressor, refers to a condition of high demand in which the emphasis is on mastering the demands, overcoming obstacles, and growing

and expanding as an individual. An individual who appraises a stressor as a "challenge" tends to feel confident, motivated, and positive. In contrast, those who view the same external stressor as a "threat" is more likely to feel apprehensive, fearful, and negative. Whether or not a person experiences the stressor as a threat or a challenge depends on the balance, as judged subjectively, between the environmental demands, available resources, and the person's ability to manage them.

"Coping" describes the cognitive and behavioral efforts a person makes to manage demands that tax or exceed his or her personal resources. Coping is a process in that the individual is continuously reappraising the environmental stimulus and his resources in order to determine whether or not the stressor represents a potential threat. Different coping strategies are more effective depending on the environmental demands and available resources. Some coping strategies are directly related to health, such as smoking, drinking and over- or under-eating.

#### **GENDER DIFFERENCES IN THE EFFECTS OF STRESS ON HEALTH**

Gender differences might mediate the effects of stress on health in many ways (Baum and Grunberg ,1991. Stressors could be appraised or interpreted differently by men and women. Baum and Grunberg cite the finding that women seem to report relatively more distress and that physiological response and reported levels of distress do not always correspond. Men and women may employ different coping strategies. For example, women's greater use of social support networks has been posited by some to account for the finding that women are generally less likely than men to become ill or die after the death of a spouse. If tension-reducing habits such as smoking are considered coping habits, then the health effects of coping strategies is readily apparent. Stress has been found to increase smoking improve and improve negative emotions in smokers. If men and women differ in their appraisal of situations as stressful this would impact smoking behaviors. Similarly, the use of alcohol or eating as stress relievers instead of alternative "healthier" strategies such as exercise affect health.

Examination of substance use in the military has revealed patterns different from civilian cohorts. For example, the rates of illicit drug use and cigarette smoking are similar among military women and men, while in many civilian studies, men typically have higher rates of both (Bray et al., 1996). While illicit drug use is low in the military, cigarette smoking remains a problem; in 1995, surveys found that roughly one out of four military women and one out of three military men were current smokers (Bray et al, 1996). Interestingly, military women were less likely than men to use alcohol or cigarettes in response to stress, but more likely to report "getting something to eat" as a coping strategy (Bray et al., 1996). The determinants of

substance use in military women may differ from those of civilian women. Since military women's rates more closely approximate military men's, it may be that there is a contextual factor other than, or in addition to, stress (e.g., a desire to be accepted as a soldier by male cohorts) which contributes to this behavior. An alternate explanation (possible for all findings that show differences from civilian cohorts) is that there is an inherent selection bias in terms of the women who enter the military. Indeed, the fact that military acquisition requirements specify levels of education needed, unfitting medical and psychiatric disorders, and other prerequisites or disqualifying conditions ensures that military populations are not representative of civilian populations at large.

Differences in ways in which men and women's central and peripheral nervous systems responds to stress may also account for gender disparities in health and illness. Of particular importance to women's health are new findings demonstrating and elucidating the mechanisms by which stress affects immune function. The implications for this line of research are especially intriguing in light of the fact that women in their reproductive years are at substantially greater risk than their male cohorts to develop the autoimmune diseases of multiple sclerosis, rheumatoid arthritis, and lupus erythematosus. While the etiologies of these diseases are multivariate, estrogen is thought to play a large role in the disease process.

The study of gender effects is only one of the many challenges in conducting and understanding research on the impact of traumatic stressors on military women's health. It is important to appreciate these difficulties as they help us understand studies' limitations and provide caveats about generalizability. A useful framework for thinking about military women's responses to health is provided by examining a model conceptualizing responses to catastrophic stressors such as disasters.

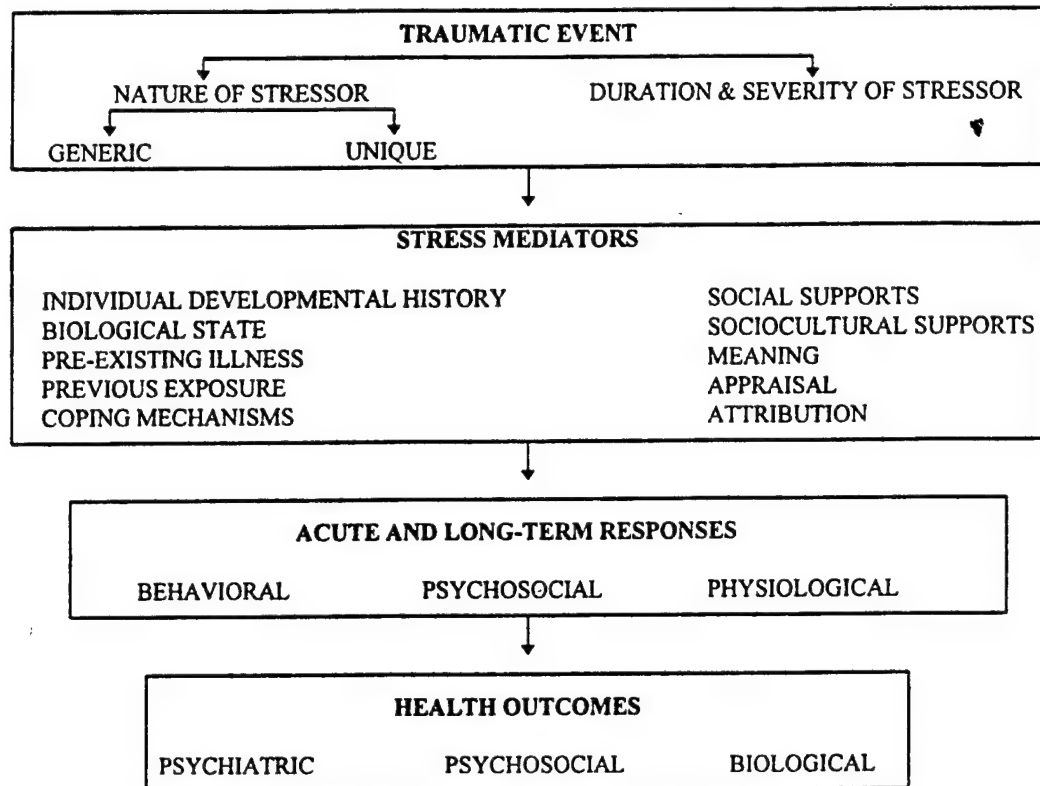
#### **A MODEL OF TRAUMATIC STRESS**

While an individual's responses to an external stressor is highly subjective, it is also true that patterns of universal responses have been observed following catastrophic traumatic stressors. Data gleaned from studies of natural disasters, combat, and a host of other "extreme environments" demonstrate that there is, in fact, some structure and predictability in human responses to such chaos (Ursano et al., 1994). The following traumatic stress model proposed by Ursano and colleagues elegantly captures the many interactive variables that need to be considered in understanding responses to a traumatic event and its stressors:



## A Model of Traumatic Stress

*(adapted from Ursano et al., 1994)*



Gender differences can affect all of the elements in this model. Before discussing the various factors affecting military women, it is instructive to consider features of stressors and gender effects which make them difficult to study.

### METHODOLOGICAL CONSIDERATIONS

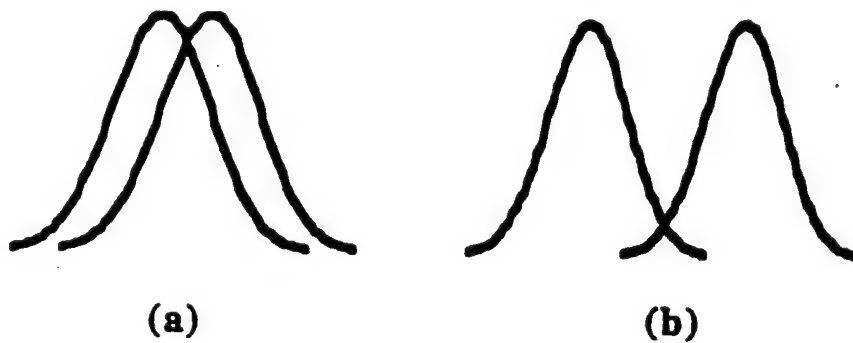
In studying which stressful elements of traumatic events and extreme environments predict outcome, data derived from cross-sectional studies should describe as completely as possible the domains outlined in the model above. It is important to underscore the dynamic process of stressor-mediator-response interactions and the need for careful descriptions of when and how the data were gathered with respect to the onset of the stressor(s). It is well documented, for example, that the relative contributions of psychological and physiological stressors involved in creating combat stress casualties vary over time. The incidence of combat stress casualties in combat follows a U-shaped curve: casualties are very high initially when psychological factors such as fear and anxiety take a large toll, then diminish, then rise again as physiological factors such as fatigue and sleep deprivation predominate.

Similarly, the stressors encountered during a war or deployment change. The types of diagnoses and behavioral disturbances encountered during the first half of the Vietnam Conflict differed dramatically from those at the end of the war when demoralization was a prominent factor (Camp, 1994). The American experience in Somalia also points out the dangers of describing stressor events globally; the stressors experienced during the early stage of the operation when the primary mission was distribution of food and medical supplies expanded sharply when disarmament efforts were undertaken and a score of American casualties were sustained. As these examples illustrate, it would be misleading to describe cross-sectional data gathered at any one point in time as the sine qua none of "psychological and physiological responses to war stressors."

In evaluating sex differences in the effects of the environment on health and performance, it is important to establish whether there are sex differences in exposure to relevant environmental conditions, or in the response to those conditions. Depending upon the measure of environment or response, this question may be posed in terms of a sex difference in prevalence, or in terms of an average differences in scores for women and for men. That is, for a noncontinuous, or dichotomous, variables (e.g., diagnosis of posttraumatic stress disorder), one would ask whether there is a difference in the likelihood of diagnosis for women and men.

For a continuous, or quantitative variable (e.g. performance of a cognitive task), the question would be whether the average scores of women differs from that of men. As a first step in evaluating the significant of an observed sex difference, whether in a noncontinuous or continuous variable, it is important to know the magnitude of the sex difference. Moreover, if a sex difference is found, it is essential to consider whether the difference has any functional consequences.

The magnitude of an observed sex difference, however, must be interpreted in relation to the variability among women and that among men. A graphic illustrating this point for a hypothetical variable is presented in Figure . Sex differences are most accurately interpreted as distributions of scores -- one distribution representing scores of women and one representing scores of men. The degree of overlap of those distributions is the most salient characteristic of the picture.



***Schematic of frequency distributions representing hypothetical sets of scores for two groups. On the left (a), two closely overlapping distributions are shown. Although, in this example, group differences may be statistically significant, group membership is of little predictive value, as the variability in scores within each distribution exceeds that between the two. On the right (b), two distributions characterized by minimal overlap are shown. In this case, group differences may be statistically significant and group membership may be of some predictive value in operational settings as well. Even in (b), however, there is substantial within-group variability in scores. Factors accounting for that variability need to be considered. Moreover, the significance of between-or within-group variability to the performance of military assignments should be assessed. In some cases, individual or group differences may be of little practical significance.***

Similar to the distribution depicted on the previous page in (a), for example, the overlap of the distributions of scores representing performance of cognitive tasks by women and men is substantial. This suggests that it may not be useful to consider whether an individual is a woman or man when assigning cognitive tasks. In contrast, distributions representing upper body strength for women and men more closely parallel the graphic in (b). It is like that more men than women will be able to accomplish tasks requiring considerable upper body strength. even in (b), however, there is substantial within-group variability in scores. Only a fraction of men will be able to accomplish such physically demanding tasks.

Thus, factors other than gender that account for within-group variability need to be considered. Moreover, the significance of within-or between-group variability to the performance of military assignment should be assessed. In some cases, individual or group differences may be of little practical significance. When group difference exist, it is important to ask how distinct the frequency distributions need to be to justify policy decisions based on gender.

The degree to which researchers can provide qualitative and quantitative information of what kinds of behavioral and cognitive responses occur to what sorts of individuals under what specific circumstances, governs our ability to compare stressors and responses across military operations and time. Refined methodology will also allow for larger sample sizes yielding greater statistical power for analysis.

#### **STRESSORS IN THE MILITARY: GENERIC AND UNIQUE**

Men and women may differ in the nature of the traumatic stressors they experience. General characteristics of the traumatic stressor which have been shown to be related to increased psychiatric morbidity include: exposure to extreme heat or noise, darkness, possibility of recurrence, suddenness and unpredictability, exposure to grotesque, degree of physical threat to self or others, loss of friend or loved one, intentional harm, causing death or harm to another and

creation of physical injury (Ursano et al., 1995). These elements may affect men and women differentially during combat. For example, due to the combat exclusion policy, men are more likely to be affected by direct combat-related stressors such as enemy fire and exposure to the dead and grotesque. Increasingly, however, women are subject to similar stressors. With the advent of modern weaponry, there is no longer safety in the rear. Indeed, there may be a different character to the stress experienced by support soldiers. For example, some observers of soldiers in the Gulf War were struck by the calm displayed in front-line combat troops in contrast to anxiety manifested in soldiers at the rear. Seemingly counterintuitive, these observations highlight the need to study risk-reducing/protective factors such as realistic training and playing an active role at the front, in contrast to being "a sitting duck" in the rear.

In addition to the myriad stressors unique to combat, a constellation of aspects of military life have been found to be stressful and are often overlooked. While these have been studied extensively in male military personnel, little is known about the impact of the following on women: frequent separations and reunions; regular geographic relocations; "the mission must come first"; regimentation and conformity of military service; early retirement relative to civilian counterparts; threat of death or injury during training and deployment; threat of capture during deployment; structured and hierarchically organized social systems; and separation from nonmilitary community (Ridenour, 1984; Ursano and Holloway, 1985)

Another low-level stressor which was reported by women in the Gulf was the lack of access to female-specific supplies, such as feminine hygiene and undergarments. Lest these be dismissed as trivial concerns, they affect women's physical health (e.g., development of vaginal infections, risk of toxic shock syndrome) and psychological health (stress of being "different" and not valued). The logistics commands of the various services have been instructed to remedy this problem for future deployments.

There are some mission-related stressors to which women may react differently than male cohorts. In extreme environments there are often a number of behavioral and medical problems that arise from boredom and isolation: substance abuse, fights, AWOL, sexually transmitted diseases, etc. Typically, these manifestations of stress have been associated more often with men, whether or not women will respond in a similar manner remains to be seen.

## **STRESS MEDIATORS IN THE MILITARY**

### **Social Supports**

A very important stress mediator in the military is the unit in which an individual works. Unit cohesion is a very strong protective factor in diminishing psychiatric morbidity in the aftermath of catastrophic stressors. A strong sense of group identity contributes both to enhanced performance of the group and to added resilience in its members. In this vein, one must be careful in generalizing stressors encountered during a transitional phase in which minority members (e.g. women) are first introduced to a unit, to other units or even to that same

unit later in time. Women have been noted to use larger numbers of social supports more frequently than men. The unit climate, then, is critical to women's health and performance.

### Leadership

Leadership has been shown to be a major determinant of unit members' psychological and physical health in combat. Similarly in peacetime, command plays a very important role in servicemembers' lives and can be a unique source of support or threat. A leader who treats all unit members fairly, irrespective of gender or race, is essential to enhanced unit and individual functioning. In contrast, a leader whose actions are based on prejudice can inflict substantial suffering. While there are avenues of remediation available in the military, one cannot avoid an unhappy occupational situation simply by quitting - a factor which can cause significant distress.

### Developmental considerations

Within a single lifetime changes occur over time, driven by biology and context, that can also modify differences between the sexes. Individual resiliency and vulnerability may wax and wane over the life cycle as a result of biological, psychological, and sociocultural events. A military career progresses through stages across the life-span. Thus a developmental perspective further enlightens our understanding of sex differences. Events that may modulate environmental effects on health and performance, include, but are not limited to, endocrinological changes associated with reproductive cycles and events, attitudinal changes accompanying life events such as marriage and childbirth, and age effects on cognitive performance. In studies of military personnel, it is important to examine their responsibilities at work (generally reflected by rank) and at home (e.g., child and elder care responsibilities.)

### Gender Difference in Anatomy and Physiology Pertinent to Military Women and Stress

Superimposed upon the larger cycles within a lifespan are more rapidly cycling rhythms. The biologically-driven endocrine rhythms, such as menstrual cyclicity in women and seasonal variation in testosterone levels in men, are among such influences. Cyclic variation in estrogen and progesterone in women is thought to modify stress reactivity, for example. In men, testosterone levels vary across the seasons, such that peak testosterone levels occur in the autumn, and the lowest levels occur in the spring. The effects of this circannual rhythm are not known. Ultradian rhythms, or the seasonal variation in hours of light per day, which are known to affect mood and cognition, provide another example of an external environmental event that affects behavior. Little is known about the effects of these cycles on sex differences in health and behavior.

Environmental stressors such as heat and weightlessness may have more pronounced effects upon women. The impact of these physiological challenges must be factored in when predicting women's psychological, behavioral and physiological responses to extreme environments.

Women's anatomy and physiology are crucial to keep in mind when preparing troops for

nuclear, biological and chemical threats. Little is known about gender differences in the metabolism and side effects of many drugs, including those for chemoprophylaxis of nerve and biological agents. Gender differences in weight, body composition of fat, cerebral blood flow, gastric emptying time, dietary practices, and the use of hormones all affect drug metabolism and need further study on their relation to women's health and performance. Applied technology to make field environments more comfortable and safer for women are important. Some have noted that water discipline can be more difficult to achieve in women in desert climates or when wearing MOPP gear because of difficulty in finding suitable places and methods of urination. The adaptation of appliances found helpful by women in sports and camping might be explored.

### Coping

The way people evaluate what is happening to them and the ways that they cope with it predicts whether or not psychological distress will result and its intensity. Since appraisal is intimately related to resources, these two processes should be viewed as highly interdependent (see below.) Coping strategies bear directly on health in that maladaptive reactions such as increased use of tobacco, alcohol, "junk food" and high risk behaviors may contribute directly to morbidity and mortality, while adaptive mechanisms such as exercise, sleep hygiene and good dietary habits may serve as protective mechanisms.

### Training

The importance of training as a protective factor in minimizing stress cannot be overemphasized. It is too often assumed that observations of individual or group differences reflect immutable processes. When this question has been asked empirically, it has been more frequently found to be the case that individual differences can be overridden by training and practice. An example of military relevance is found in research on bodyhandlers (McCarroll et al., 1993). Although women report greater levels of stress in anticipation of bodyhandling than men, following training and experience with body handling, the sex difference in anticipatory stress evaporates.

For both men and women, training needs to be realistic to accomplish its goals. For example, training for chemical warfare has traditionally employed a one-shot CS (tear gas) exposure exercise. This format classically conditions somatic and anxiety symptoms to the protective mask, of particular interest to women who may be especially vulnerable to anxiety disorders. Such training resulted in significant gas-mask phobia cases in the PGW. It is recommended that future training be designed to provide frequent practical exercises in order to foster familiarity, confidence, and the special skills required to function in an NBC battlefield (Jones, 1995).

## **HEALTH EFFECTS**

### Common Psychiatric Responses to Trauma and Disaster

Because there has been limited study of women in combat, disasters and other trauma



serve as a comparator. For most people, resiliency is the hallmark of long-term responses to a disaster; posttraumatic psychiatric symptoms are transitory and represent a "normal response to an abnormal situation". (Ursano et al, 1995). When discussing adverse psychiatric outcomes in the wake of trauma, Post-Traumatic Stress Disorder (PTSD) is frequently the disorder that comes to mind for many people. However, PTSD is only one of the psychiatric responses seen. Common responses to trauma and disaster seen in both men and women are listed below:

***Psychiatric diagnoses***

Organic mental disorders secondary to head injury, toxic exposure, illness, and dehydration  
Acute Stress Disorders  
Adjustment Disorder  
Substance use Disorders  
Major Depression  
Posttraumatic stress disorders (PTSD)  
Acute Stress Disorder  
Generalized anxiety disorder  
Psychological factors affecting physical disease (in the injured)

***Psychological/behavioral responses***

Grief and other normal responses to an abnormal event  
Family violence

Only recently have disaster responses been examined for gender effects. The work that has been done demonstrates that women have significantly higher rates of psychiatric disorders than men and are more likely to see physicians following a disaster. This finding is not surprising in view of the fact that women have been shown to demonstrate a higher prevalence rate for depressive and anxiety disorders than men - common responses to disaster.

**Psychiatric Disorders in Women**

While there have not been comparable studies of mental disorders in the military, epidemiological studies on civilian populations have demonstrated a higher prevalence of several psychiatric disorders in women. Women have higher rates of major depressive disorder, seasonal affective disorder, rapid cycling bipolar disorder, eating disorders, somatization disorders, panic disorder, phobias and dissociative disorders (Blumenthal, 1995). Explanations which could account for the higher rates of unipolar depression in women are useful in thinking about other psychiatric disorders disproportionately affecting women (Wolk and Weissman, 1995).

*(adapted from Wolk & Weissman, 1995)*

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***Artifactual***

Women admit mood symptoms more readily  
Women seek help more often  
Diagnostic criteria are biased by sex



Women recall depressive symptoms more readily than men  
Antisocial personality and alcohol abuse are the male equivalent of depression

***Real***

**Biological**

Genetic transmission predisposes women to depression  
Female endocrine physiology predisposes women to depression

**Sociocultural**

Women are exposed to more stress or weight events as more stressful  
Women have a disadvantaged social status in many cultures  
Women are more vulnerable to the effects of poor social support

**Cognitive**

Women develop a cognitive schema similar to the learned helplessness model

Women are more likely to have a ruminative response style

The most comprehensive epidemiological study of military women and war-related trauma to date has been the National Vietnam Veterans Readjustment Study (NVVRS), a nationally representative prevalence study of PTSD and other psychological readjustment problems among Vietnam veterans (Schlenger & Jordan, 1996). Based on a multidimensional index of exposure to war zone stressors (e.g. wounded and dead; combat; violence; deprivation and other stressors), 40% of the women veterans studied were felt to have experienced high stressor exposure while in the war theater. At the time of the study (1987) 26% of the women who served in Vietnam met criteria for PTSD at some point in their lives (Weiss et al., 1992) and 8.5 percent currently were symptomatic of PTSD (Schlenger et al., 1992). Moreover, women Vietnam veterans also had comorbid psychiatric disorders of major depression, generalized anxiety disorder, and alcohol abuse or dependence (Jordan et al., 1992).

Ongoing studies of women veterans of the Persian Gulf War should provide additional data on women's responses to the unique stressors of war environments. Moreover, these populations highlight crucial areas for study: risks faced by reservists, a growing and integral part of our nation's defense and a vastly understudied group. Issues relating to possible toxic exposure and development of a constellation of physical symptoms attributed to Gulf Service highlight the importance of developing new models for understanding environmental stressors. Of special interest is emerging data relating to the importance of focusing on work impairment rather than self-reported distress in evaluating women's responses to stress (Wolfe, 1996).

## CONCLUSIONS

As we enter the Twenty-First Century, the changing nature of military missions suggests the importance of building diversity into the US military. Different missions such as peacekeeping with its ambiguous environments provide arenas where skills and temperaments, perhaps different than those for war-fighting, are adaptive. Training must focus on maximizing individual and unit performance across a wide variety of scenarios and should be informed by research. Stressors which are easily remedied should be identified and ameliorated (e.g. supplies). Emphasis should be placed on task-focused innovation (e.g., modification of litter-carrying techniques to compensate for diminished upper body strength.) This paper has outlined areas in which a great deal more study is warranted. Future research strategies should focus on sex as one variable affecting health and performance, rather than focusing studies on "women" which serve to reinforce a minority status.

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## **Contraceptive Needs of Women in the Military**

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American women enjoy a wide range of choices for contraception. Barrier methods, one of the oldest forms of birth control, now include such new additions as the vaginal sponge and female condom. Oral contraceptives have lower doses of estrogen than ever before, and a new class of progestins have been used in recent formulations. Long-acting progestins, given as depot injections or silastic implants (Norplant), provide extended contraception with a high degree of efficacy. Copper-bearing intrauterine devices have been approved for 7 years use. Emergency postcoital contraception is available to prevent pregnancy when other methods fail, or fail to be used.

Despite the many advances in reversible contraception, our country is facing a major crisis in preventing pregnancy. The numbers are staggering: more than 50% of pregnancies in the United States are unintended! Figures for women in the military may not be much better: in one report, 36% of servicewomen who delivered a baby were unmarried; the majority were unplanned.<sup>2</sup>

Why do we have such a big problem preventing pregnancies when we have so many forms of birth control available? Unfortunately, we have yet to come up with the ideal contraceptive. Such a method would need to be free of side effects and have no long term adverse effects on our health. It should be easy to use, extremely reliable, and match the contraceptive need of the individual couple. For those in the military, contraception must be widely and readily available, able to perform in harsh climates and under adverse conditions without adversely affecting the performance of our soldiers.

All methods of birth control have potential side effects associated with their use. The hormone content of oral contraceptives has decreased significantly over time, yet the majority of women still experience one or more side effects such as breakthrough bleeding, nausea, bloating or weight gain.<sup>3</sup> Menstrual irregularity is very common with the use of Norplant, and can be found in up to two-thirds of women during its first year of usage. Irregular bleeding is also seen with depot medroxyprogesterone acetate, although the majority of users eventually progress to frank amenorrhea with continued use.<sup>5</sup> Barrier methods may result in local irritation of the lower genital tract or increase the risk of urinary tract infection. Intrauterine devices can increase the frequency and severity of menstrual cramps. Emergency postcoital contraception often results in nausea and vomiting.

The type or frequency of side effects caused by a contraceptive method may have special implications for women in the military. Irregular vaginal bleeding, a symptom easily managed in most situations, can prove to be a much greater problem when it occurs in a field environment. Not only does it pose logistical and sanitary constraints upon the servicewoman and her

commander, but fear of pregnancy prompted by the bleeding may place a strain upon already limited health care resources. In the Persian Gulf conflict, irregular bleeding was one of the most common gynecological conditions treated at the field hospitals.<sup>6</sup>

Not only are side effects disturbing to the patient, they can also increase the chance of unintended pregnancy by reducing compliance. Rosenberg and associates estimated that premature discontinuation of oral contraception (OC) because of side effects was a major contributor to unintended pregnancies.<sup>7</sup>

Compliance, or the ability to consistently and effectively use a form of birth control, is perhaps the primary reason for the difference between theoretical and actual effectiveness rates of the different contraceptives (see Table 2). Studies have shown that as many as 19% of OC users miss one or more pills per cycle.<sup>2</sup> Compliance with a coitus-related form of contraception, such as one of the barrier methods, may be more difficult when sex occurs with great frequency. Certain groups of patients, such as adolescents and women over the age of 40, were less likely to be using any form of contraception.<sup>8</sup> A study of servicewomen found that the youngest soldiers, who were the most sexually active, were the ones least likely to use contraception. Clearly, no form of birth control will be successful if it is not used consistently.

Military service itself may increase the risk of noncompliance. Irregular work schedules and sleep deprivation can make it more difficult to adhere to a pattern of pill taking or use of barrier methods. When the choices of available contraceptives are limited by the availability of local military health care resources, a woman may be forced to select a type which is unfamiliar to her or uncomfortable to use. Should she have a question about her birth control method, it may be difficult for her to get a quick response; our military health care system is notoriously difficult to access for routine questions.

Contraceptive failure can occur if the user is not well acquainted with their method of birth control. It is extremely difficult for health care providers to spend the time required to educate patients about their birth control method, yet that information can mean the difference between effective contraception and unintended pregnancy. Failure to follow simple rules, such as not establishing a routine for taking birth control pills, has been recognized as the most common reason for missing pills, which then triples the risk for pregnancy. Women on OCs should know what to do when they discover they forgot to take a pill, or two pills, or more. Methodology is also important for barrier methods: inserting a diaphragm too early or removing it too soon can increase the risk of pregnancy. Many women are unaware of backup methods, such as emergency postcoital contraception, which can be used if unprotected intercourse inadvertently occurs.

Birth control among troops deployed for an armed conflict is an aspect of contraception unique to the military. As we learned from the Persian Gulf war, the contraceptive requirements for a deployment cannot be overlooked by military planners. In that conflict, the crude pregnancy rate among female soldiers in one sector was 2.3%. More than half of the evacuations of women soldiers were solely for the diagnosis of pregnancy. Concern over the possibility of pregnancy was the most common gynecologic complaint for outpatients, while pregnancy-related problems, including ectopic pregnancy, made up 60% of gynecologic admissions.

Desert Storm revealed a number of problems in meeting the contraceptive needs of our

deployed soldiers. While considerable time was devoted to vaccinating our soldiers, little or no time was given to the discussion of contraception. Many women soldiers related that they had been told to stop their OCs because they wouldn't be needed or wouldn't be available. In fact, relatively few brands of OCs were available, and 14-16% of gynecologic outpatient visits were solely for the purpose of obtaining OCs.<sup>9,10</sup> Contraception, or the lack thereof, proved to be a significant drain upon our deployed health care system.

How do we improve the effectiveness of contraception for our servicewomen? Our initial step should be towards maximizing the methods we have currently available. Women should be counseled thoroughly about their contraceptive choices and educated extensively in the method they select. This form of intervention should take place very early in their military careers, perhaps even upon inprocessing to the military. Although the costs involved with the various forms of birth control is always a consideration, the military should ensure that the contraceptives in our health care system are uniformly available to servicewomen, no matter where they are stationed. Should problems arise or questions surface, our military health care system should look for user-friendly ways to handle these situation, such as telephone referrals through a nurse provider. Also, we need to better educate our patients about alternatives such as emergency postcoital contraception that can be used as a backup if a method fails or is used improperly.

Our military planners should already be focusing upon ways to improve contraception for deployments. Women should be counseled about the particular aspects of birth control methods related to their prospective duty assignment, including the possibility of capture and imprisonment, and adequate time given to institute a new method. The individual soldiers and their units should have adequate supplies of barrier contraceptives, and women on OCs should be given an ample supply so as not to burden the medical system for routine pill refills. Pregnancy should be tested for prior to deployment; one unit in Saudi Arabia estimated that 25% of their pregnancies could have been detected prior to their arrival. Health care providers should be familiar with the different methods of birth control, their limitations and complications.

Last but not least, the Department of Defense needs to initiate research in the military unique aspects of contraception. We need to test the newer contraceptives under field conditions to ensure they don't impair the performance of our troops. Programs to improve compliance and minimize side effects can reduce the number of unwanted pregnancies and save valuable health care dollars. New combinations of contraceptives that eliminate vaginal bleeding while providing effective contraception are needed for future conflicts.

Almost 50 years have elapsed since the birth control pill was first marketed. Since then, we have continued to make important advances in birth control, but we are still far from finishing. The goal of eliminating unwanted pregnancies will take a dedicated effort from our health care providers, administrators, and researchers. It will be no easy task, but our troops deserve no less.



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Table 1 Attributes of an Ideal Contraceptive

Effective
Easy to use
Free of side effects
No adverse long-term health consequences
Inexpensive
Durable

Table 2 Theoretical vs Actual Effectiveness of Contraceptives

Method	Theoretical Failure Rate*	Typical Use Failure Rate*
Condom	2.0	12.0
Diaphragm	6.0	18.0

Sponge	9.0	28.0
Spermicides	3.0	21.0
Oral contraceptive	0.1	3.0
Copper IUD	0.8	<1.0
Depo-Provera	0.3	0.3
Norplant	0.2	0.2
Tubal ligation	0.2	0.4

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\*Percent women pregnant during first year of use.

## **Vaginitis/Cervitis: Diagnosis and Treatment Options in a Limited Resource Environment**

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Vaginal and cervical infections particularly by sexually transmitted organisms, are a common and important health related problem to military women. These infections not only affect the mental and physical health of women, they may adversely affect the ability of military women to perform their duties. These infections frequently produce symptoms sufficient to cause pain, irritation, foul odor, discharge, intense itching; even sleep loss. These conditions and symptoms may also cause embarrassment to women working and living in close quarters. Additionally, these conditions lead to decreased productivity and time off from the workplace for evaluation, diagnosis and treatment. All of these factors may significantly impact the ability and readiness of military women to perform their assigned tasks and duties. Furthermore, the adequately trained health care providers, laboratories and advanced technology required for rapid diagnosis and treatment of these conditions may not always be readily available to deployed military women especially while in remote areas or developing countries. Speculum examination requiring special tables, stirrups, directed lighting and other specialty equipment may not be easily accessible in many deployment situations.

### **Scope of the Problem**

Vaginitis and cervicitis occur in upward of 12 million women each year in the United States.<sup>1,2</sup> These infections occur most commonly in the 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> decade of life. The prevalence of these infections is highest in the 17-25 year old age group particularly the STDs. Thus, these infections will commonly occur among women in the U.S. Armed Services by virtue of their age range alone. Additional considerations including socioeconomic background, increased frequency of sexual activity, numbers of partners and prevalence of STDs in their partner pool will enhance the risk of military women over the civilian population at large. For example, military women are more likely to meet and choose other military personnel as their sexual partners and there is sufficient data to indicate that deployed military men frequently engage in high-risk sexual behavior and contract STDs. In one study, of 1,744 military men deployed aboard ship for six months to South America, West Africa and the Mediterranean, 49% reported prior sexual contact with a commercial sex-worker and 22% reported a history of an STD before deployment. During the subsequent six-month deployment, 42% reported sexual contact with a commercial sex-worker, 10% acquired a new STD and 10% reported inconsistent condom use.<sup>3</sup>

Recent preliminary reports from a survey of Army personnel indicate that 18% of women respondents report having had at least one STD over a 2 year period and this may be an underestimate especially if women with an STD history were less likely to respond to the survey.<sup>4</sup> In another study of 476 asymptomatic active duty army women presenting for routine pap smears, 39(8.2%) tested positive for chlamydia.<sup>5</sup> This is a high rate of asymptomatic chlamydia infection. These statistics are further compounded by the facts that only about 50% of all unmarried military personnel report using a condom during last intercourse and women under the age of 25, the age group at highest risk for acquiring an STD, account for two-thirds of the enlisted women that are pregnant at any given time.

There is additional accumulating evidence that other, less obvious, factors may influence the high rate of STDs among military women. Statistics show that 31% of women on active duty in the U.S. Army smoke cigarettes and 17% are heavy smokers.<sup>4</sup> This is significantly higher than the number of smokers in the general population.<sup>4</sup> Several recent studies have demonstrated that smoking is a significant risk factor in the acquisition of numerous STDs including *Chlamydia trachomatis*, *Neisseria gonorrhoeae* and pelvic inflammatory disease and its sequelae.<sup>6,7,8</sup>

Delayed diagnosis and treatment of STDs and urinary tract infections may well lead to significant, even life threatening long-term sequelae. Serious upper genital tract infections, permanent infertility and life-threatening ectopic pregnancies are all recognized and well documented sequelae of lower urogenital tract infections in women.<sup>1,2</sup> Recent studies also indicate that the presence of these cervical/vaginal STDs significantly increase the risk of HIV acquisition.<sup>9,10</sup>

### Characteristics of the Infections

The most common symptom of both vaginitis and cervicitis is an abnormal vaginal discharge. The patient is unable to discern cervical from vaginal infection. The sexually transmitted organisms *Neisseria gonorrhoeae* and *Chlamydia trachomatis* are responsible for most cases of cervicitis while *Trichomonas vaginalis*, *Candida* species, and bacterial vaginosis account for nearly all cases of infectious vaginitis/vaginosis.<sup>2,4,11,12</sup>

Chlamydial infections are the most common bacterial STDs in the developed world. There are an estimated 4 million chlamydial infections annually in the United States alone with over 2 million occurring in women.<sup>2,13,14</sup> Over million cases of gonorrhea occur in the United States each year.<sup>2</sup> Presenting complaints include vaginal discharge, dysuria and abnormal uterine bleeding. Both gonorrhea and chlamydia can and often do present with minimal or very subtle symptoms necessitating screening and/or testing for minimal symptomatology in the "at risk" populations. Sequelae of these infections include pelvic inflammatory disease, ectopic pregnancy, permanent infertility and chronic, often debilitating pelvic pain.<sup>2,14</sup>

Infectious vaginitis and vaginosis account for some 8-10 million outpatient visits a year in the United States.<sup>15</sup> The three conditions accounting for the vast majority of these cases are

trichomonas vaginitis, candida vaginitis and bacterial vaginosis.

Vaginal yeast infections commonly occur in women. It has been estimated that 75% of women will have at least one episode of yeast vulvovaginitis, with 40-45% having two or more episodes.<sup>16</sup> The predominant organism causing these infections is *Candida albicans*, and occasionally non-albicans candidal species (*Candida tropicalis*, *Candida (Torulopsis) glabrata* or other *Candida* species). The most common presenting complaint is vaginal and/or vulvar pruritis with or without vaginal discharge,<sup>17</sup> however some 30% of women with yeast infections may present with discharge alone.

An estimated 3 million cases of trichomoniasis occur in the United States annually. This infectious form of vaginitis is caused by *Trichomonas vaginalis*, a sexually transmitted motile protozoan. It accounts for approximately 10-15% of all cases of clinically evident vaginal infections. Infection with this organism is most often characterized by a copious, foul smelling discharge but the clinical presentation can be quite variable including a significant number of women without specific vaginal complaints.

Bacterial vaginosis (formerly known as Gardnerella vaginitis, Haemophilis vaginitis and nonspecific vaginitis) is the most common cause of malodorous vaginal discharge in women.<sup>16</sup> It has been estimated to be the etiology in as many as 45% of women with vaginitis/vaginosis.<sup>18</sup> Bacterial vaginosis (BV) is caused by a shift in the vaginal flora from the normal high concentrations of hydrogen peroxide-producing lactobacilli to a mixed flora consisting of high concentration of anaerobic organisms, *Gardnerella vaginalis* and *Mycoplasma hominis*. This shift in flora is associated with a homogenous, white vaginal discharge, elevated pH (>4.5), the production of amines and the presence of clue cells.

#### **"Gold Standard" Diagnosis of Cervical/Vaginal Infections**

The clinical presentation of cervical/vaginal in women is highly variable ranging from asymptomatic to debilitating symptoms from deep-seated infection. The more common presentations include symptoms such as persistent and often foul smelling vaginal discharge, intense vulvovaginal pruritis and irritation, dysuria and/or pelvic pain. Diagnostic accuracy based on clinical symptoms alone varies dramatically and is quite subjective. Clinical suspicions are confirmed with specific laboratory or office-based microscopic tests. The laboratory test with the greatest sensitivity and specificity will be considered the "gold standard". While there is no official listing of the "gold standard" laboratory tests for a given organism or condition, there are a number of tests which are considered to have the highest sensitivity and specificity.

### Gold Standard Table

<u>Infection</u>	<u>Pathogen</u>	<u>"Gold Standard Test"</u>
Cervicitis/urethritis	<i>C. trachomatis</i>	PCR and Culture
	<i>N. gonorrhoeae</i>	Culture
Bacterial vaginosis	Multiple	Gram stain
Candida vaginitis	<i>Candida</i>	Culture
Trichomoniasis	<i>T. vaginalis</i>	Culture

These confirmatory tests are often expensive and take days to as much as a week before a definitive result is available. It is crucial that rapid, relatively inexpensive and reasonably accurate diagnostic tests be developed. They would need to have reliable sensitivity and specificity that would minimize overtreatment as well as undertreatment.

### **Rapid Tests**

Each of the cervical/vaginal infections in women have some characteristics, either clinical, microbiological or immunological that may be exploited in the development of simple, rapid diagnostic testing.

Chlamydia, gonorrhea and trichomoniasis all induce the migration of inflammatory cells when they infect the lower female genital tract. Lactoferrin is a stable iron binding glycoprotein found concentrated in secondary granules in inflammatory cells but not found in lymphocytes or monocytes.<sup>20,21</sup> This represents an ideal marker for inflammatory cells which have migrated to the lower genital tract in response to these infections. Preliminary investigations correlating genital tract lactoferrin levels with chlamydia, gonorrhea and trichomoniasis have been reported in abstract form but have yet to appear in the literature.

Two consistent characteristics of women with bacterial vaginosis is the high vaginal pH and the presence of amines.<sup>19,22</sup> The vaginal pH is raised as the glucose fermenting lactobacilli which produce lactic acid are replaced with a mixed flora whose metabolic byproducts are less acidic. The vaginal pH is the most sensitive of the tests for bacterial vaginosis but it lacks a high degree of specificity. The amine odor test is based on the release of amines (putrecine, cadaverine, trimethylamine) following alkalization with 10% potassium hydroxide.<sup>23</sup> The sensitivity of this test has been reported as high as 87% with 98% specificity.

The currently used diagnostic tests also require a speculum examination. This requires an experienced clinician as well as specialized equipment including a pelvic exam table with stirrups. We have recently completed several studies utilizing self-collected vaginal specimens to diagnose chlamydial, gonococcal and trichomonal infections. In the first of these studies vaginal (introital) swabs were collected from 300 women by the clinician.<sup>24</sup> In 200 of these women a self-collected introital sample and a urine sample were also submitted for chlamydial PCR testing. Women were instructed on proper introitus specimen collection by the study personnel, with a pictogram provided as additional reference. Self-collection was performed in strict privacy. The patient herself placed a dacron-tipped swab one inch into the distal vagina for 10 seconds. The swabs were then placed by the patient into PCR transport media. Women then underwent pelvic examination and cervical, urethral and vaginal specimens were obtained for chlamydia PCR, culture, enzyme immunoassay (EIA). Women were considered to be infected with chlamydia if any site was positive by culture or in addition, they were positive by PCR and negative by culture with confirmation by PCR with a second primer. Overall, 37(12.3%) women were infected with *Chlamydia trachomatis*. The sensitivity of PCR on introital samples was 92% and the specificity was 100%. This technique performed as well as any other method of collection and testing including endocervical PCR, endocervical culture, endocervical EIA, urethral PCR and urethral culture. Among the 200 women that self-collected vaginal introital samples again the sensitivity and specificity was as good or better than samples collected from any other site. The self-collected samples had a lower sensitivity (81% vs 92%) compared to clinician-obtained samples. We have improved our patient instruction materials to increase self-collection sensitivity to optimize diagnostic accuracy.

In subsequent studies we have evaluated this sampling site for the diagnosis of gonorrhea and trichomoniasis. In a study of 100 women undergoing vaginal introitus sampling for *Neisseria gonorrhoeae* and tested by PCR we found a sensitivity of 100%.<sup>25</sup> This was equivalent to endocervical culture and better than endocervical or urethral PCR (82% and 64% sensitivity respectively). In our evaluation 100 women tested for *Trichomonas vaginalis* by PCR, all 15 women positive for this organism by culture and/or wet mount were identified by PCR of samples obtained by swabs from the vaginal introitus.<sup>26</sup>

This data strongly supports our contention that the vaginal introitus samples can be used to accurately diagnose chlamydial, gonococcal and trichomonal infections in the lower female genital tract. Furthermore, the self-collection of vaginal introital samples was successful (no patients were unable to collect the samples), well accepted by the women and may well enhance their willingness to undergo testing by imparting an element of privacy to specimen collection. The vaginal introitus sampling site provides easy access to vaginal secretions containing exfoliated cells from the lower genital tract, soluble cell product and frequently organisms as well. Obtaining these samples is no more difficult than inserting a tampon, and can easily be accomplished by most women in a minute or less during a visit to a restroom. Therefore, self-collection is a feasible strategy for military women especially in a setting with suboptimal conditions.



### Treatment Options

A single dose of azithromycin, an azalide antibiotic, is as effective as doxycycline for one week as a treatment for chlamydial infection.<sup>27</sup> It has further been shown to have good efficacy in eradicating lower genital tract gonorrhea when used in a 2 gram dose. However, at this higher dose significant gastrointestinal symptoms were reported in 35% of patients.<sup>28</sup> Studies of the efficacy of the lower 1 gram dose in eradicating *Neisseria gonorrhoeae* have been variable. In one study 25 of 27(93%) of patients were cured with a single 1 gram dose.<sup>29</sup> In another study 76/82(93%) of males were cured with gonococcal urethritis.<sup>30</sup> Other smaller studies have suggested lower efficacy. Further studies are underway to determine if a 1 gram dose will be sufficient to adequately treat uncomplicated gonorrhea. At present, additional coverage is necessary for effective eradication of gonorrhea.

The vast majority of yeast infections (80-90%) respond to standard, single or multiple dose antifungal agents. Oral fluconazole in a single 150 mg dose has been shown to be an effective treatment for vaginal candidiasis with low toxicity and minimal side effects. In a review of 14 comparative and 14 noncomparative clinical studies conducted in 19 different countries a total of 3929 patients were treated with fluconazole.<sup>31</sup> A clinical response was demonstrated in 94% of patients and mycological cure in 85%. The drug was well tolerated and no serious adverse events were reported in any of these trials.

Metronidazole has long been the treatment of choice for trichomoniasis. Most often administered in a 2 gram single dose with cure rates between 86% and 97%.<sup>32</sup> Metronidazole has also been highly effective in the treatment of bacterial vaginosis with cure rates reported from 84% to 95% depending on whether treatment is with a 2 gram dose(84%) or a 7 day regimen.<sup>16</sup>

### Conclusions

There exists today the technology and data to diagnose cervical and vaginal infections in women with a fairly high degree of accuracy. A great deal of this technology is not available in a form that is currently useful in a limited resource environment. However, it is feasible using currently available and evolving technology to develop simple, rapid and sensitive self-tests for the most common treatable cervical and vaginal infections in women. This would utilize self-sampling techniques and currently available dipstick tests combined with other tests in development (i.e. rapid lactoferrin determinations). Single agent treatment regimens could be assigned according to test results. There remains considerable research to provide a useable test kit and to determine its diagnostic accuracy.

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## **Chronic Dieting in Active Women: What are the Health Consequences?**

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For millions of American women dieting or "watching-their-weight" has become a way of life. In fact, two national surveys report that 38-40% of American women are dieting (33, 66). This unrelenting obsession with body weight and shape is fueled primarily by the sociocultural and psychological pressures placed on women to be thin (62, 63). One unfortunate consequence of this national obsession with thinness is that many women feel they are judged on physical appearance instead of their skills, knowledge, or capabilities (54, 62, 63). Thus, thinness has become a symbol of beauty, acceptance, and competence for women (54). In addition, women often report that their self-esteem and self-worth are linked to how they look and how much they weigh (62, 73). Consequently, it is not surprising that women frequently say that their mood for the day is determined by the morning encounter with the bathroom scale. Because of these pressures, women often strive to be thinner than what may be realistically achievable. In an attempt to achieve this elusive thinness, many women will try almost any weight loss strategy. Some of these strategies include restrained eating, chronic energy restriction, excessive exercise, or various other unhealthy dietary practices (6, 32, 33, 77). Unfortunately, most attempts at long-term weight loss fail (12, 70, 74); thus, many women remain heavier than the current sociocultural ideal.

Active females in the military, like most women in our society, are often concerned or preoccupied with their body weight and shape. They too feel pressure to conform to certain "ideal" body shapes and sizes. Nevertheless, their source of pressure is two-fold. Not only are these women burdened by the general sociocultural demands placed on women to be thin, but they are also expected to be physically fit (3) and meet military weight standards (19, 53). Failure to meet these weight standards can result in severe consequences such as reduction in rank, reduction in pay, and/or discharge from active duty (59).

The purpose of this paper is to review the possible health consequences of chronic dieting in active women. First, the prevalence of dieting in American will be discussed and the stress placed on all women to be thin at an increasingly young age will be reviewed. Then the characteristics of various types of dieters will be described. Finally, the nutritional and health consequences of chronic energy restriction or restrained eating in active women will be reviewed.

## Dieting in America

Dieting is a way a life for many American women. It is now estimated that 40% of all adult women are trying to lose weight (33, 66). Ironically, of those who reported wanting to lose weight, 20% consider themselves the "right weight" and 4% are underweight (33, 66). Thus, many of the women currently dieting do not need to diet, since they are not overweight. Certainly, these individuals would benefit more from practicing sound nutrition and exercise habits than from trying to diet for weight loss. Conversely, NHANES III reports that 35% of women are overweight ( $> 27.3 \text{ kg/m}^2$ ) but only about half of these women are trying to lose weight (42). Thus, a health paradox exists in American (57). Those women that do not need to lose weight are dieting, and those that would benefit from weight loss are not successful.

As adult women have become more focused on body weight and body image, the number of young females dieting for weight loss has also increased. A 1993 NIH symposium on eating disorders reported that 60% of young girls grades 1 to 5 developed distorted body images and overestimated their body weight (1, 67). They also reported that 70% of females diet between the ages of 14-21 years. Other surveys support these data. The 1990 Youth Risk Behavior Survey reported that 44% of females grades 9 to 12 were trying to lose weight (66). In addition, a recent survey by Emmons (27) on dieting practices in female high school seniors ( $n=780$ ) reports that 73% were dieting (achieving  $> 5$  pound weight loss). Emmons (27) also observed that the primary distinguishing feature between dieters and nondieters was that the dieters had a perception of being overweight. Thus, the dieters had a greater feeling of body dissatisfaction and the desire to be thin although they were not necessarily overweight. These studies suggest that the cultural conditions and pressures for women to be thin begin at an early age. Unfortunately, the type of dieting practices used by young people are often unhealthy and potentially harmful (31, 66). In addition, data now indicate that young females concerned about body weight and image are more likely to smoke (30, 54). Thus, inappropriate dieting may help to establish unhealthy behaviors in young females that are carried into adulthood and negatively influence life-long health.

## Types of Dieters

The chronic dieter is usually defined as an individual who consistently and successfully restricts energy intake to maintain an average or below average body weight (6, 32). This type of dieter is frequently referred to as a "restrained eater" and may be at greater risk for poor nutrient intakes and health problems than the weight cyler or yo-yo dieter. The weight cyler is the individual who successfully diets to lose weight, then regains the lost weight, and then repeats the cycle again. These individuals are unsuccessful at maintaining long-term weight loss. Factors that trigger these individual to cease "watching their weight" are numerous but usually involve the inability to make permanent life-style changes. However, regardless of the cause, once these individuals cease their vigilance they eventually regain the lost weight. The long-

term health consequences associated with this type of dieting, such as increased risk for cardiovascular and coronary heart disease, are still controversial (10, 35, 36, 45, 46, 55).

### **Health Consequences of Chronic Dieting**

For most healthy women, "going-on-a-diet" for a designated time will present few nutritional or long-term health problems (29). However, serious health problems may arise for the active female who chronically restricts energy intake while expending high amounts of energy in exercise.

#### **Nutrient and Energy Intakes**

One nutritional consequence of constantly dieting for weight loss is poor energy and nutrient intakes. It is well documented in the research literature that when active women have energy intakes less than 1800-1900 kcal/d, many macro and micronutrient intakes are below recommended values (28). For example, many active women have protein and carbohydrate intakes below that recommend for active individuals (18, 43). Thus, protein intakes are not adequate for the maintenance and repair of lean body mass and to cover the cost of protein used for energy during exercise. In addition, carbohydrate intakes are not adequate to replenish glycogen stores used during exercise. Most researchers agree that active women engaged in endurance activity have higher protein needs (1.2-1.4 g protein /kg body weight) (43) than the RDA (0.8 g protein/kg body weight) (28). Active females also require a minimum of 5 g of carbohydrate/kg body weight to maintain glycogen stores (58). If activity is high and training occurs on a daily basis the carbohydrate needs may be greater than 8 g of carbohydrate/kg body weight (17,18). Individuals with poor energy intakes usually have poor micronutrient intakes, especially calcium, iron, magnesium, zinc, and B complex vitamins (2, 9, 34, 38, 40, 49, 51). These micronutrients are especially important for active individuals because they play an important role in energy production, hemoglobin synthesis, maintenance of bone health and strength, and in adequate immune function. Thus, prolonged energy restriction combined with poor micronutrient intakes can place active women at risk for poor nutritional status (7, 49, 51) and decreased bone density (23, 34, 52). This is especially true if supplemental micronutrients are not used. In addition, many of these women complain of fatigue, frequent injuries, irritability, and poor athletic performance (24). These complaints can frequently be reversed by increasing daily energy intake and ensuring that the individual is in a more positive energy state before beginning any physical activity (8, 24).

#### **Body Composition and Body Weight**

Research examining the effect of dieting or "restrained eating" on body composition in sedentary women shows that dieters are usually fatter and weigh more than controls (27, 54). This relationship appears to be true even if the groups are of normal body weight, that is, the dieting group is still heavier and fatter than the



nondieters (27, 50, 54). However, this relationship is not observed in active women. Studies done in active women who restrict energy intake show that these individuals have similar body fat levels and body weight when compared to active women who are nondieters (5,48). Thus, these active women appear to be consciously restricting energy intake and exercising heavily to maintain a body size and shape they find acceptable, and one that is similar to their nondieting counterparts.

### **Resting Metabolic Rate (RMR) and Total Daily Energy Expenditure**

It is well documented that dieting reduces RMR greater than that predicted based on changes in total body weight and fat-free mass (FFM). Thus, if an individual is chronically dieting total daily energy expenditure will be reduced. Exercise has frequently been added to weight loss programs as a way of preventing the decrease in RMR observed with dieting. Unfortunately, close examination of the data show that RMR decreases significantly with both diet and diet-plus-exercise programs in premenopausal women, but that the drop with dieting is significantly greater than that observed with diet-plus-exercise (71). Thus, restriction of energy intake, with or without exercise, reduces metabolic rate below that predicted. This in turn means that fewer calories are required to maintain body weight.

One study that illustrates the effect of severe dieting (520 kcal/d) and exercise on RMR and FFM was done by Donnelly et al (21). Female subjects were assigned to one of six dieting groups for 12 weeks: control (diet only); endurance exercise (4 d/wk of treadmill walking or cycling at 70% heart rate reserve); weight training (3 d/wk using 6-8 reps at 70-80% of one-repetition maximum); endurance plus weight training; control for 4 weeks with subsequent endurance exercise; weight training for 4 weeks with sequential endurance exercise. The results showed that weight loss did not differ between the groups and ranged from 16.7-22.3 % of baseline. However, the endurance exercise plus weight training group had the greatest decrease in RMR (240 kcal/d decrease) over the 12 week period ( $P < 0.05$ ), while the amount of FFM lost was similar to that lost in the other groups ( $\approx 4$  kg). Thus, in the presence of severe energy restriction, it appears that neither endurance exercise, weight training, or the combination of the two exercise modes are able to increase weight loss or slow the decrease of FFM or RMR compared to dieting without exercise. In fact, the group with the highest exercise energy expenditure (i.e., the greatest negative energy balance) had the greatest decrease in RMR while on the 12-week diet.

### **Psychological Stress**

The psychological consequence of severe energy restriction depend on a number of factors and may vary from person to person. Some of the psychological stresses reported with severe dieting are increased depression, obsession with food and body weight, increased incidence of binge-purge eating behaviors, increased stress of constantly trying to "make weight" or maintain an unrealistic body weight, and increased risk of developing more severe eating disorders (6, 13, 16, 26, 59). In addition, chronic dieters or individuals in chronic negative energy balance complain of



poor ability to concentrate, fatigue, poor performance, and the interruption of sleep patterns (24, 26). All of these factors can dramatically change the way the dieter performs daily functions such as interpersonal relationships, working, studying, and physical activity.

### **Disordered Eating Behaviors**

The pressure to be thin at any cost can lead some active females to develop disordered eating behaviors (37, 59). These behaviors can range from subclinical eating disorders to clinically diagnosed anorexia nervosa or bulimia (6, 72). New data suggest that many active women may have subclinical eating disorders, as evidenced by their preoccupation with food, calories, body shape and weight. However, these women do not have all the criteria necessary to classify them with a clinical eating disorder (6, 68, 69, 76). Some of the trigger factors associated with the onset of an eating disorder in active women can include the following: prolonged periods of dieting, frequent weight fluctuations, a sudden increase in training volume, a traumatic stressful event and/or pressure placed on the female to maintain or achieve a low body weight (59, 69).

One study done in military personnel illustrates this point. Peterson et al (59) examined the presence of bulimic weight-loss behaviors in individuals enrolled in three weight-management programs: a military weight-management program (n=51), a civilian weight-management program (n=53), and a comparison military (normal weight) group (n=51). The military weight-management group was made up of United States Air Force (USAF) members who were mandated to enroll and required to lose weight or face possible administrative or discharge action. Individuals in the civilian weight-management group were volunteers. The study included both males (n=78) and females (n=77). Results showed that the military weight-management group engaged in bulimic weight-loss behaviors two to five times more often than the comparison groups. They engaged in vomiting, strenuous exercise, and the use of the sauna/steam room for weight loss four times as often as the civilian weight-management group. Comparison of males and females within the USAF military weight-management group showed that there were no statistical differences in the reported bulimic weight-loss behaviors. However, when examining overeating behaviors, women in the military weight-management program reported engaging in binge eating twice as often as males (males=42%; females =81%). Finally, more individuals (53%) in the military weight-management group reported losing at least 10 pounds in a month compared to the other groups (18%). The results were similar when they examined the number of individuals gaining 5 pounds in a week. At least 41% of military weight-management group reported doing this compared to only 27% in the civilian weight-management group and 14% in the control group. The authors concluded that bulimic weight-loss behaviors may develop in individuals who feel extreme pressure to lose weight. Thus, under pressures to lose weight or face possible discharge, these USAF soldiers resorted to excessive and unhealthy weight loss measures.

### **Exercise Performance**

Research examining the effect of chronic energy restriction on exercise performance comes from studies examining athletes involved in aesthetic or lean-build sports, such as dancers, gymnasts, and wrestlers (13, 64). These individuals are constantly pressured to maintain a lean body shape for their sport, thus many of these athletes chronically diet. In addition, these athletes are thinner and typically report higher incidence of body image distortions and dieting behaviors than athletes participating in sports allowing more normal builds, such as basketball, volleyball or downhill skiing (6, 20). These athletes also report poor energy intakes, increased risk of injury, poor ability to concentrate, and prolonged recovery time from injuries than athletes in normal-build sports (6, 64). For the active female, poor physical performance can have a devastating psychological effect, especially if physical performance is tied to job related expectations as they are in the military (3).

### **Menstrual Dysfunction**

There is a growing body of evidence suggesting that athletic amenorrhea, and other reproductive hormone abnormalities seen in active women, may be due in part to periods of energy deficiency (4, 24, 25, 41, 60, 75). Negative energy balance in the active female is mostly likely due to three factors: high energy expenditure, low energy intake, and high psychological and physical stress. It now appears that changes in the menstrual cycle, as a result of high exercise energy expenditure and/or periods of negative energy balance, is an energy conserving strategy to protect more important biological processes (11, 25). Although many in the medical field disregard exercise induced menstrual dysfunction, the prevalence in active women may be as high as 50% (39). Thus, the possibility that an active female may have some type of menstrual dysfunction is high and cannot and should not be ignored.

Researchers have examined the effect of negative energy balance on the menstrual cycle and reproductive hormones by investigating the role of diet (energy restriction) alone, exercise alone, or diet plus exercise. Human studies examining the effect of energy deprivation on reproductive abnormalities report that energy restriction can alter the hormonal profiles and the menstrual cycles of healthy women (4, 41). The magnitude of energy restriction and the body's level of energy reserves before dieting begins may influence the degree of menstrual dysfunction that occurs with energy restriction. The impact of energy restriction on menstrual function may also depend on an individual's initial hormonal status before dieting begins (60). In other words, if an individual already has luteal phase deficiency or is anovulatory, dieting may cause the expression of amenorrhea more quickly as compared to others who begin the diet with normal menstrual function. Finally, studies also show that diet plus exercise regimens severe enough to produce a significant weight loss will also produce the greatest changes in menstrual function (14, 75). Thus, this combination has a more negative effect on menstrual status than just exercise alone or diet alone. This may be due in part to the greater negative energy balance and resulting weight loss that occurs when dieting is combined with high exercise energy expenditure (75).

It has now been well documented that menstrual dysfunction in active women, especially amenorrhea, can significantly affect long-term health. If active females develop menstrual dysfunction due to restrictive energy intakes and active lifestyles, then significant health problems can develop (25). Two of the most well documented health problems are decreased bone mineral density (22, 44, 61, 65) and increased musculoskeletal injuries (47). Studies show that axial bone mass is reduced by approximately 20% in amenorrheic athletes compared to eumenorrheic athletes, and by 10% compared to sedentary women with normal menstrual cycles (15, 23, 34, 52, 56). Thus, it is imperative that the active female be appropriately educated regarding the adverse effects of menstrual dysfunction and the treatments available. Remember that the most appropriate form of treatment for exercise or diet induced menstrual dysfunction lies in its prevention.

### **Summary**

Evidence suggests that there is ever increasing pressure on American women to be thin. This pressure drives women to want to be thinner than what might be realistically achieved or required for good health. Our goal as nutrition and health professionals is to help women achieve and maintain a healthy body weight throughout the life-cycle. This includes helping young females accept their body size and shape as well as placing more emphasis on health and fitness than on weight in this population. This process begins with the identification of what constitutes a healthy body weight for a particular individual based on genetic, physiological, social, and psychological factors. In addition, it should be a weight that can be realistically maintained while keeping risk factors for chronic disease low. Table 1 outlines some strategies for helping individuals to identify and maintain a healthy body weight.

Since the military demands that soldiers meet body weight standards, it is imperative that they also provided accurate and motivating diet and exercise education programs to help soldiers achieve these standards. For the female soldier the pressure to maintain a thin body is two-fold, both from society and the military. Research shows that when pressures to achieve a weight goal are high, women will attempt any weight loss method to achieve success, regardless of health consequences. Thus, any successful weight-loss or weight-maintenance program needs to address life-style changes that can help the soldier achieve and maintain healthy weight and fitness goals throughout their military career.

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Table 1. Techniques for identifying and maintaining a healthy body weight throughout the life-cycle.

I. Put emphasis on personal health and well-being, not weight.

- Less focus on the scale and more on healthy habits such as regular exercise, stress management, and making good food choices.
- Set realistic weight goals. (What is the maximum weight for your height that would be acceptable and reduce risk of chronic disease? What was the last weight you could maintain without constantly dieting? What weight is the maximum weight acceptable by the military?)
- Mark progress by measuring changes in fitness level, health parameters (positive changes in blood pressure, glucose, lipids, etc.) and general overall well-being.
- Make lifestyle changes that help you maintain a healthy weight for yourself -- not your job, your spouse, your friends, or to prove a point.

x

x II. Make changes in diet and eating behaviors.

- Do not constantly deprive yourself of favorite foods or set unrealistic dietary rules or guidelines.
- Make basic dietary changes that reduce energy intake, that fit into your lifestyle, and that you know you can achieve.
- Reduce fat intake but remember a lower fat diet will not guarantee weight loss if a negative energy balance (reduced energy intake and increased energy expenditure) is not achieved.
- Eat more whole grains, cereals, fruits, and vegetables.
- Make sure adequate dietary fiber is consumed ( $> 25$  g/d).
- Do not skip meals or do not let yourself get too hungry.
- Reduce or eliminate late night eating (after 8 p.m.) if possible.
- Eat something for breakfast. This will prevent you from being too hungry and overeating at lunch.
- Plan ahead and be prepared for when you might get hungry. Always have good food available when and where you get hungry.
- Identify your own dietary weaknesses and plan a strategy for dealing with these difficult times.
- Remember you are making life-time dietary changes that will result in weight loss. You are not going on a diet that you will someday go off.

x

x III. Make changes in exercise behaviors.

- Start and maintain a regular exercise program. This is an absolute requirement for the maintain of a healthy body weight.
- Pick an activity or activities that you enjoy and that you can do on your own.
- Pick an activity that is inexpensive and does not require fancy

equipment. This means you will maintain your fitness program even when you are traveling and away from home.

- Find an exercise partner or exercise class to get you started, motivate you, and get you through the difficult days until exercise is part of your life-style.
- Participate in group exercise activities whenever possible.
- Plan regular exercise into your day and add additional exercise by walking instead of driving, or using the stairs instead of the elevator.

Realize that you are making a life-time change and a life-time commitment to yourself for good health and weight management.

## **Patterns and Risk Factors for Exercise-Related Injuries in Women: A Military Perspective**

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### **Introduction**

As we strive to achieve the goals set forth by Healthy People 2000, more women should become physically active and begin to exercise. However, an increased participation in exercise will result in an increase in the incidence of acute and overuse musculoskeletal injuries. High rates of injury have been noted in association with physical training in both military and civilian populations. Importantly, injury rates are high when initial fitness or activity levels are low, as well as when training frequency, intensity and/or duration increase. Koplan et al (21), as well as others (13,22) have shown that as the number of miles run increases, the rate of overuse injuries rises. In order to optimize the benefits of physical activity, exercise and fitness, and to minimize the negative effects of associated injuries, a better understanding of risk factors for exercise-related injuries is necessary for military and civilian women and men.

Physical fitness is a significant component of military readiness and therefore, an important aspect of training for military women, as well as men. Because of the importance of physical fitness and training for the military, a number of military studies have examined the associations among training, physical fitness, and injuries. Health-related components of physical fitness include: 1) cardiorespiratory fitness; 2) muscular strength; 3) muscular endurance; 4) flexibility; and 5) body composition (7). Military data indicate that the level of physical fitness may be a critical element in the occurrence of physical training-related injuries. Given that training injuries result in a significant loss of training days and limited duty in military populations, efforts to identify risk factors have been undertaken. The purpose of this report is to review a variety of issues related to physical training injuries in military women. Specifically we will discuss:

- incidence of physical training-related injuries
- the types of injuries most frequently noted
- risk factors for training injuries

While information provided in this review will be derived primarily from studies of military women, the general principles should be applicable to other young vigorously training active women.

These data on military women are important because data on injuries in women from the civilian sector are limited, and typically reflect injuries incurred during recreational activities or sport competitions. Furthermore, data on women from civilian populations cannot control for the amount of activity across subjects, which can vary widely. Measures of fitness are not usually available in large civilian surveys, thus, it is difficult to identify independent risk factors among non-military women. Results of these military studies reviewed should provide clues regarding risk factors among civilian men and women.

### **Incidence for Physical Training-Related Injuries Among Women**

Each branch of the military has its own basic and advanced training programs; thus, the total amount of exercise performed, in terms of intensity, duration, and frequency, differs, depending on the specific training program. As such, the rates of musculoskeletal injuries would be expected to vary. One of the first studies reporting injury rates among women in basic training noted an incidence of 16.3%, a rate 2.9 times higher than the men (31). These rates are quite low when one considers subsequent studies during basic training. However, only those 20% who required an orthopedic or physical therapy specialist were included. When all injuries are included, injury rates of 54% (24), 50.5% (12), 57% (5), and 67% (44) have been reported for Army women attending eight weeks of basic training; a rate of 22% for women in Navy basic training (eight weeks), and a rate of 49.9% for women in Marine basic training (12 weeks) (38). For women in the Marine Officer Basic Training School (10 weeks), an overall injury rate of 59% has been reported (38). These rates appear high when one considers the duration of training, lost duty time, and economic implications: at least one of two women will develop a musculoskeletal injury that may limit their duty and potentially compromise completion of their training. However, these incidence rates are not markedly different from women in college athletics or other athletic groups in civilian populations (20,23).

Included in the overall rates of injuries are incidence rates for stress fractures. Stress fractures are a duty limiting injury, and have been studied within military populations for this reason. Table 1 presents a comparison of stress fracture rates among women and men in various training programs. The data clearly indicate that rates among women are higher than among men, with relative risks for women to men ranging from 1.6 to 5.8. Interestingly, the rates from the studies of Reinker et al (31) and Brudvig et al (6) are markedly lower than the other studies. The lower rates from Reinker et al (31) probably reflect their methods of data collection: only subjects who were referred onward to a specialty clinic were included, or approximately 20% of those seen at the Troop Medical Clinic for an injury. In contrast, the study by Brudvig et al (6), which focused solely on stress fractures, included as the denominator all those men and women in basic and advanced training over a one year period; only those with radiologically diagnosed stress fractures were included as cases. Despite an overall incidence of only 3.4%, the rate among Caucasian women was 11.8% as compared to a rate of 1.4% in African American women.

Friedl et al (8) conducted a large survey of active duty Army women, and asked them if they had ever had a stress fracture. By this approach, a prevalence of 16.1% was estimated. The response rate was 70.5%, and no comparison of responders to non-responders was made. Thus, the data may have been biased in favor of those who had experienced a stress fracture. Stress fracture rates among women in Navy basic training range from 1% to 12% (38). Reasons for the wide ranges are unclear, but may reflect geographic differences in training programs, variations within each population, or methods of diagnosing stress fractures. Further information would be required to resolve these discrepancies.

As can be seen in Table 1, overall rates of musculoskeletal injuries among women in military training programs are exceedingly high, with stress fractures constituting a significant proportion of all injuries. Clearly any intervention that would lower these rates would be beneficial for both the military and the individuals at risk.

### **Injury Types and Patterns Among Women**

The types of injuries are usually broken down into three major categories: overuse, acute/traumatic, and wounds, the most common type of injury among woman is one resulting from overuse. Depending on how the data are collected, traumatic injuries typically account for only 20 to 30% of all injuries whereas overuse injuries account for 60 to 80% of all injuries (10,17,24). The highest rates of injury occur within the first several weeks of training (36). Although limited data are available for military women, the most common traumatic injury is a sprain, usually of the ankle or knee. The most common types of overuse injuries observed include strains, tendonitis, stress fractures, and stress reactions. Lower body overuse injuries comprise the majority of overuse injuries, with the knee, ankle, lower leg, and foot being the major sites of injury. Jones et al (10) in the mid-1980s evaluated the most commonly diagnosed injuries among women enrolled in an eight week Army basic training course and found that muscle strains accounted for 15.6% of all injuries, followed by stress fractures (12.6%), sprains (5.9%), tendonitis (5.5%) and overuse knee complaints (2.1%), such as patellofemoral pain syndrome (PFPS). They found that 88% of all injuries were to the lower extremities. More recently in 1996, Westphal et al (44) reported on the types of injuries seen among women in Army basic training. They found that 74% of all injuries were a result of overuse, with strains and/or musculoskeletal pain accounting for 71% of overuse injuries. Stress fractures accounted for 2.6% of overuse. Tibial stress fractures accounted for the greatest proportion of stress fractures: for 61.6% (24) and 50% (30) in two studies, but not in another (31). These differences may reflect the methodologies used for identifying stress fractures. For all injuries, the differing rates for specific types and sites can in part be accounted for by how the data were coded, whether the data were collected from surveys or medical charts, and characteristics of the sample studied.

Of importance with respect to types of injuries is time loss, or the number of training

and/or work days lost because of the injury. Kowal (24) noted an average loss of 13 training days due to injuries, with 40.1% of injuries preventing participation in any type of physical activity. The data of Jones et al (10) show that 30.1% of women experience an injury which result in one or more days of lost duty. Ross et al (36) reported that 2.9% of women who incurred an overuse injury during basic training in the Australian Royal Air Force were removed from their starting course and had to join a later course. If acute injuries were included, the rate would be approximately 5%. Overall, these time loss figures are much higher than those reported for men in the military (10,16), but given injury rates for women are higher, in particular for stress fractures, a greater number of training days lost for women would be expected. Because of the high injury rates, the types of injuries, and the implications of the injuries, numerous studies have sought to identify risk factors so that preventive measures for reducing the incidence of physical training-related injuries could be instituted.

### **Risk Factors for Exercise-Related Injuries**

A number of studies have shown associations between various personal, environmental, and behavioral factors and the occurrence of training-related injuries (5,10,11,12,13,18,20,23,26, 30,32,34,35,36). Some extrinsic factors, such as excessive load on the body, poor equipment, training errors, and environmental conditions have been examined. In addition, intrinsic factors, or personal characteristics, such as physical fitness, anatomic malalignment, biomechanical discrepancies/imbbalances, body stature, and behavioral patterns have been considered. The most consistently identified, independent risk factors for training injuries to date include components of physical fitness and behavioral factors.

### **Components of Physical Fitness**

The components of physical fitness previously mentioned, cardiorespiratory fitness, muscular strength and endurance, flexibility, and body composition have all been examined for association with injury risk. The one component that stands out in virtually all studies is cardiorespiratory fitness, or aerobic capacity: the lower the initial level of fitness when starting basic training, the greater the risk of experiencing a training-related injury. Jones et al (12) clearly demonstrated that the rate of injury in women increased as physical fitness test run times increased (i.e., the longer it took to run one mile, the higher the rate of injuries). The results of this study are shown in Figure 1. Similar findings have been reported by others for women in training (5,15,24,30,44). Bell et al (5) showed that the incidence of injuries in those with slow one mile run times was 4.2 times that of those with fast times. Similarly, Westphal et al (44) estimated a relative risk of 1.6 for those in the slowest running quartile as compared to the fastest quartile. Furthermore, Moore et al (30) showed that the incidence of stress fractures was 4.3 times higher in women whose running distance was less than 2.8 miles per workout. The findings in women are consistent with the evidence in men, where it has been clearly shown that low physical fitness (slow run times) (10,11,12,15,20,34) and/or history of little running or physical activity prior to basic training (29,36,40) are strong and independent risk factors for injuries.



With regard to muscular strength and endurance, the data for women are less clear (12,15,24,44). Kowal (24) reported that static leg strength was significantly lower in injured as compared to uninjured women undergoing basic training, but other reports are less convincing. Jones et al (15) provided evidence that the number of push-ups was associated with an increased risk of injury, with the lowest risk for those who completed the most push-ups (first quartile), and the highest relative risks for those in the third (1.6) and fourth (1.5) quartiles (See Figure 2). Westphal et al (44) used a variety of measures, including the numbers of sit-ups and push-ups, maximal weights for incremental dynamic lifting, bench press, and military press, and a load carriage task, to evaluate the contribution of muscle strength. They found that lower dynamic lift weight, an indication of lower body and low back strength, was strongly associated with increased risk, with a relative risk of 1.4 (Figure 3). In contrast, the numbers of sit-ups in two minutes and maximal bench press weight supported only a weak association, both with relative risks of 1.3, when the least and most fit quartiles were compared. No association between number of push-ups and injuries was observed. The load carriage task, a functional measure indicative of an individual's ability to apply total body strength and power to a task as a timed event, was more compelling: the relative risk between the least fit and most fit quartiles was 1.8 (Figure 4). A recent study by Bell et al (5) was also unable to support a strong association between muscular strength, as measured by an isometric test of maximum hand grip force, or for sit-ups and push-ups. In general, upper body muscle strength and endurance may be modest risk factors, but their overall contribution to the risk of injury in military basic training is probably low. This may reflect the fact that in basic training, the primary physical stress is aerobic weight-bearing activity, such as walking, marching, and running.

Relatively little data on the association between flexibility and injuries exist for military or civilian populations. Bell (4) found no association between flexibility and risk of injury in basic training, whereas a study of women collegiate athletes showed a bimodal association with both the least flexible and most flexible groups at greater risk of injury than those of average flexibility (19).

The final component of physical fitness, body composition, as reflected by weight, percent body fat and/or body mass index, has received much attention. Kowal (24) found that heavier women were more likely to sustain an injury, and his finding has been supported by other investigators (10,12,15). However, in addition it has been noted that extremely thin women are also at risk (10,12,15). Other investigators have not been able to demonstrate an independent effect of body fat or body mass index (5,36,44). It may be that a greater body mass is primarily a reflection of low aerobic fitness, and not an independent risk factor for training injuries.

### **Behavioral Factors**

To date, limited information is available with respect to behavioral factors that might increase the risk of injuries in women. The primary factor that has been identified in men is smoking (11,34,36,41). Jones et al (11) showed that male trainees who smoked 10 or more cigarettes per day were at 1.9 times the risk of injury as non-smokers. Reynolds et al (34) found that male infantry soldiers who were smokers had a three times greater risk of

sustaining an injury than nonsmokers. Similarly, Snoddy et al (41) showed that smokers had significantly more profile days as compared to nonsmokers. Ross et al (36) concluded smoking was not a risk factor, but they showed a relative risk of 1.4 with a p value of 0.08. Thus, a trend for increased risk was evident. The increased risk associated with smoking for men appears to hold up for women (8,44). Westphal et al (44) reported a relative risk of 1.3 for training-related injuries in women who smoked as compared to nonsmoking women (Figure 5). Consistent with these findings, Friedl et al (8) noted a relative risk of 1.9 for smokers as compared to non-smokers when the injury of interest was stress fractures. Recent evidence suggests that the healing of bone takes 70% longer in smokers as compared to nonsmokers (37). In sum, while the strength of the association between smoking and training injuries in women is weaker than has been observed for men, smoking deserves further research to determine the true extent of the risk.

Another potential behavioral risk factor that will also require further study is the relation between the consumption of alcohol and physical training injuries. Westphal et al (44) evaluated the association between women trainees who did not drink and those who consumed alcohol one, two to three, or four to five days per week. A significant dose response was found for time-loss injuries, with the relative risks of 1.1, 1.5, and 1.7, respectively, noted for the successively more days of alcohol consumption as compared to non-drinkers (Figure 6). Thus, alcohol appears to be an independent risk factor for injuries.

### **Other Risk Factors**

In addition to physical fitness and behavioral risk factors mentioned above, several other intrinsic risk factors have been identified. Two of these include race and menstrual status. In the studies reviewed, Caucasian race was associated with a greater risk for overall injuries (5), with a relative risk of 1.3 for Caucasians to Blacks, but this increased risk may reflect the markedly greater risk for stress fractures among Caucasians as compared to Blacks. In the studies that have examined the issue of stress fractures and race, relative risks of 8.4 (6) and 2.7 (30) have been noted for Caucasians to Blacks. Further studies will be needed to determine whether there are racial differences for other types of injuries.

Finally, menstrual status is also a well-known risk factor for stress fractures. Women with fewer than 10 menstrual cycles per year have been shown by many investigators, in the military (8,30) and civilian (2) sectors alike, to have a greater risk of stress fractures. Moore et al (30) noted a 5.6 times greater risk, and Friedl et al (8) a 1.9 fold greater risk among women who had menstrual disorders. Clearly many factors must be considered when determining risk factors.

### **Discussion**

As the number of women who exercise increases, it is reasonable to expect that the incidence of musculoskeletal injuries will increase proportionally. Moreover, given that several of the objectives of Healthy People 2000 are to promote physical activity and specifically to increase the proportion of women who exercise regularly, this could also increase the incidence of physical training injuries. Injury rates are high for women engaged in physically demanding military training, especially basic training where rates average 20 to

30% per month. Thus, investigations to identify risk factors for such injuries are critical. Furthermore, if we wish those who currently do exercise to maintain their activities, preventive approaches to minimize exercise-related injuries must be implemented. The military setting offers a unique opportunity to identify risk factors associated with physical training because all women in basic training undergo a vigorous, and regimented physical training program and the effect of amount of training can be controlled for.

The most important, consistent risk factor for sustaining a physical training-related injury, as identified by military research, is aerobic capacity or cardiorespiratory fitness. Across all studies, measures reflecting aerobic capacity, such as time to complete the one or two mile runs for the physical training test, the number of miles run prior to basic training, and the number of miles run during a training session, were associated with risk of injury: women with initial low fitness levels were at greater risk, with relative risks ranging from 1.6 to 4.3 (5). Importantly, all of the women in any one study were engaged in the same program and therefore performing comparable activities. Among the other components of physical fitness, muscle strength and endurance were only modestly associated with injury risk, whereas flexibility appears to be a more complicated and weaker risk factor. Data from the civilian sector have also been unable to demonstrate strong associations between injuries and muscle strength and endurance or flexibility (23,26). Finally, the association between body composition, as measured by percent body fat or body mass index, and risk of injury was weak. However, women who are at either extremes may both be at increased risk. Among behavioral or life-style patterns, smoking and alcohol consumption were associated with increased injury rates, with a dose-response effect noted for alcohol consumption.

Overuse injuries are the primary injury in women, with acute injuries being less common. Similar findings have been noted for women in the civilian sector (17). Importantly, stress fractures are one of the leading types of injuries, with rates ranging from 2.3% to 21.0% of all women in basic training (5,8,14,24,30,44). Otherwise, tendonitis and strains account for a large proportion of physical training injuries, with PFPS, iliotibial band friction syndrome (ITBFS), and medial tibial stress syndrome (MTSS) commonly noted. Although limited data for the primary site of injury are available, injuries to the knee, ankle and foot are common. Interestingly, among the civilian sector, the knee is the primary site of injury, and account for 20 to 30% of all injuries (27,43,45); PFPS is the most common (43,45). Overloading and overuse have been shown to be the primary factors contributing to ITBFS (28) and PFPS (43).

When data for women and men in a weight-bearing environment are compared, many commonalities can be observed. The primary risk factor in women, aerobic capacity, is also the primary risk factor for men. Of great importance is the finding by Jones et al (12) that despite the two-fold greater risk of injury among military women as compared to military men, when the crude risks are stratified on indicators of aerobic capacity, the difference in rates disappears. In other words, women and men of the same aerobic fitness level have the same risks of injury. Bell et al (5) have recently reported similar findings in their study of men and women. They found that when factors related to physical fitness were controlled, including run time, number of sit-ups and push-ups, and muscular strength, rates between men and women were similar; the relative risk for women to men was 1.14, with confidence

intervals of 0.48 and 2.74 (5). Interestingly, this finding of no differences in rates between men and women is consistent with data from civilian studies (9,17,21,23,25,33,46).

For other components of physical fitness, muscular strength and endurance, and flexibility, the patterns of association in men are similar in women (10,11,20). The men and women exhibiting the greatest muscle strength and endurance tend to have lower risks of injury, while it appears that both the most and least flexible women and men may be more likely to experience injuries than their more average peers.

With regard to body composition, studies from the civilian sector have not observed an association between risk of injury and body composition (26). However, military studies have shown a bimodal association such that those at the two extreme ends were at greatest risk (10). Civilian studies cannot control for the confounding associations between fatness, fitness, and amount of training as military studies do.

Health behavioral factors also impact the risk of training. As has been noted for women, smoking and alcohol are risk factors for men (11,34). On the basis of the risk factors identified, Snoddy et al (42) recommended that the military consider history of smoking and the scores on the physical fitness test as criteria for selection into basic training.

Although it is clear that aerobic fitness, smoking, and alcohol consumption are risk factors for exercise-related injuries in women, many other issues specific to women need to be addressed. Factors related to the anatomic and biomechanical characteristics of women have received some attention, but no specific conclusions have been reached. Moore et al (30) looked at a variety of anatomic characteristics of women in association with stress fractures, including pelvic width and subtalar joint range of motion, but no striking patterns emerged. Furthermore, Knapik et al (18) noted that knee flexor and/or hip extensor strength and flexibility imbalances were predisposing factors for injuries in women athletes. However, more work will be required to address anatomic and biomechanical factors. Other issues relate to intrinsic risk factors, such as menstrual patterns and reproductive history, family history of osteoporosis, as well as extrinsic factors including dietary patterns and energy balance, history of eating disorders, oral contraceptives, training history prior to menarche, and overtraining. All of these issues are exceedingly important in the prevention of training-related injuries. For more information, review articles on special problems of the female athlete (1,3) should be considered.

It is well established that physical training can lead to musculoskeletal injuries, several civilian studies emphasize this reality. Sedgwick et al (39) followed women enrolled in a fitness program over a four year period and found an acceleration of musculoskeletal impairment of approximately 10%, as measured by self-reported pain and discomfort, number of consultations with specialists, and physical limitations due to injuries. Moreover, Koplan et al (22) recently completed a 10 year follow-up study in runners, and found that 27% of the initial cohort of women had either temporarily or permanently stopped running due to injuries. The probability of sustaining an injury was associated with a higher weekly mileage. Thus, it is important to find ways to reduce the incidence of exercise-related injuries if the health and fitness benefits of physical activity are to be accomplished by civilian and military women and men.

Studies examining ways to reduce training-related injuries, including the types of

training programs, amounts of activities required to achieve the desired level of physical fitness are needed. Interestingly, Jakobsen et al (9) demonstrated a 50% lower rate of injuries when subjects were given individual, progressive training programs, instructions on stretching, warming-up and cooling-down, monitored for training errors, and had their running shoes checked, as compared to controls who continued their own training schedules. However, the primary factor responsible for a lower rate could not be isolated. Studies such as this provide hope that higher fitness levels can be achieved with lower risks of injury. However, additional studies will be required to address these issues.

## **Conclusions**

In summary, recent military studies have documents a number of components of physical fitness and health behaviors that influence the risk of exercise-related injuries among women. The patterns and risk factors for injuries among women in the military are similar to those found for men. We would expect the same general principles to hold for civilian women as well as men. Lower levels of fitness are associated with greater risks of injury among women Army trainees. Importantly, aerobic fitness is a primary risk factor for an exercise-related injury. Although rates of injuries among women are significantly higher than for men, when aerobic fitness is controlled, the rates of injury are comparable. Also, smoking and consumption of alcohol have been shown to increase the risk of injury. Finally, in order to prevent injuries, studies to examine types of training programs, the amounts of activities required to achieve the requisite level of physical fitness, and the contribution of specific biomechanical or muscular imbalances are needed for women, especially.

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### **Figure Legends**

Figure 1. Incidence rates for time-loss injuries sustained by women in Army basic training. Women were assigned to quartiles (Q) on the basis of times to complete a one mile run. The median, range run times were 9.75 min, 6 to 16.3 min, and the Q1 and Q3 cutpoints were 6.4 and 7.7 min, respectively. Adapted from reference 10.

Figure 2. Incidence rates for injuries sustained by women in Army basic training. Women were assigned to quartiles on the basis of the number of push-ups they could complete in two minutes. The median number of push-ups was 11. Adapted from reference 15.

Figure 3. Incidence rates for injuries sustained by women in Army basic training. Women were assigned to quartiles on the basis of the amount of weight in kg they could lift during the dynamic incremental lift test. Adapted from reference 44.

Figure 4. Incidence rates for injuries sustained by women in Army basic training. Women were assigned to quartiles on the basis of the time it took them to complete the load carriage task. Adapted from reference 44.

Figure 5. Incidence rates for injuries sustained by women in Army basic training on the basis of smoking status. Adapted from reference 44.

Figure 6. Incidence rates for time-loss injuries sustained by women in Army basic training according to alcohol consumption. Women were assigned to one of four groups: Don't Drink, Drink 1 day per week, Drink 2 to 3 days per week, or Drink 4 to 5 days per week. Adapted from reference 44.

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## **Exercise in the Prevention and Treatment of Chronic Disorders in Women**

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### **Introduction**

One of our nation's objectives for improving the health of the population by the year 2000 is to increase the overall level of physical activity. The Healthy People 2000 Goals are based on a wealth of data indicating that regular physical activity confers a myriad of health benefits. At least 12 of the goals relate specifically to physical activity, including to increase the number of men, women and children who exercise regularly, and to decrease the proportion of persons who lead sedentary life-styles.

To be certain the public understands what constitutes regular physical activity, the Centers for Disease Control and Prevention and the American College of Sports Medicine (ACSM) recently provided new guidelines for exercise. These new recommendations state that "Every US adult should accumulate 30 minutes or more of moderate - intensity physical activity on most, preferably all, days of the week". Moderate intensity physical activity is defined as "activity performed at an intensity of 3 to 6 METs, or the equivalent of brisk walking at 3 to 4 m.p.h. for most healthy adults" (59). These new recommendations emphasize that extended periods of exercise and strenuous exercise are not required for health benefits, and that short bouts of moderate exercise are important for health.

A beneficial role of exercise in women's health is well accepted. Some of the health benefits of exercise include weight loss, improved control of blood glucose and insulin in diabetes (73), prevention of osteoporosis (3,26,68) reduced risk of cardiovascular disease and cancer (66,69). Unfortunately, many people do not appreciate the extent of the benefits, in terms of other specific health problems. More recent studies indicate that exercise also may confer multiple benefits in patients with other chronic health problems, including rheumatologic diseases, depression and anxiety disorders, and osteoporosis.

Despite the clear benefits of exercise, only a small proportion of women engage in regular exercise. Data from the 1992 Behavioral Risk Factor Surveillance System (BRFSS), a population-based, random-digit-dialed telephone survey of the non-institutionalized US population, indicate that only 27.1 % of adult women report participation at the newly recommended activity levels (10). Moreover, the prevalence of inactivity increases with age: 42.1 % of women 65 years and older are inactive. As much as a 50% decrease in physical activity may occur in women between the ages of 18 and 37 (4). The prevalence of participation in physical activities is related to the socioeconomic variables: income and educational level. College graduates are more likely to report participating in regular activity (33.5%) as compared to women with only a high school education (23.8%) and women with less than a high school (17.4%) education. Recent data also indicate that inactivity is greatest among overweight women: the prevalence of inactivity based on 1994 BRFSS data was 41 % for overweight women of all ages (11). The proportion of overweight women reporting no activity increased with age and decreased with educational level. Finally, data from the

Youth Risk Behavior Survey, a nationwide sample of students in all public, parochial, and other private schools, in grades 9 through 12, suggest that only 41.2% of high school girls exercised for at least 20 minutes the preceding day (31). Moreover, the percent of girls exercising the preceding day declined from grade 9 to 12 (49.3% to 32.4%). Overall, the data indicate that the women of our nation are sedentary, starting from their high school days.

Given that regular exercise may reduce the risk for and/or be effective in the treatment of various chronic health problems for which the prevalence among women is high, it seems justified that regular physical activity should be promoted more widely among women. This review will seek to provide recent information with respect to the use of exercise in the prevention and/or treatment of selected disorders/diseases that primarily affect women, including breast cancer, rheumatoid arthritis, fibromyalgia, osteoporosis, and affective disorders.

### **Breast Cancer**

The incidence of breast cancer in women between the ages of 40 and 49 was approximately 175 per 100,000 (30,48,72) in 1989. Of those 175 women, at least 30 would have died within the year from the disease (30). Unfortunately, the risk factors currently associated with breast cancer account for only 55% of the disease (8), and these factors cannot be easily modified. For example, family history, menstrual and reproductive histories, and socioeconomic status are known risk factors over which women have minimal, if any, control. One potential protective factor over which women can exert control is physical activity. In the past 10 years numerous studies have been conducted and several theories have been proposed on how physical exercise might reduce the risk of certain cancers (36). The first study results with regard to breast cancer and diseases of the breast were reported in 1985 and 1986. Frisch et al. (23) surveyed approximately 5,398 women college alumnae between the ages of 21 and 80, half of whom were former athletes and the others non-athletes. After adjusting for family history, age, menstrual and reproductive history, and body fat, they found that the relative risk of breast cancer for non-athletes to athletes was 1.86. Moreover, the prevalence of benign diseases of the breast was also significantly lower in athletes (77). This was the first evidence for a protective effect of exercise from breast cancer.

Not all subsequent reports have been as supportive. In a cohort design with data from the NHANES I study, Albanes et al. (1) found different results after controlling for similar factors: they showed that exercise was protective against breast cancer only in women who were post-menopausal. In addition, their data suggested a possible increased risk of breast cancer among the most active premenopausal women. Paffenbarger et al. (58) also failed to find any association between participation in sports during college and subsequent development of breast cancer. Dorgan et al. (17) attempted to relate physical activity to risk of breast cancer based on data from the Framingham Heart Study cohort. After adjusting for known risk factors, as well as education, occupation, alcohol intake, and age, they concluded that exercise is not protective and that moderate to heavy leisure time physical activity may actually be associated with an increased risk.

Whereas some of these results could be used to support the notion that moderate to heavy exercise may increase the risk of developing breast cancer, a case-control study by Bernstein et al. (6) provides virtually disparate results. Lifetime histories of physical activity were obtained by interviewing 774 incident cases of breast cancer in women 30 to 40 years of age and 774 controls matched for age, parity, race, and neighborhood. After adjusting for potential confounding variables they found that the number of hours per week spent exercising was a significant predictor of breast cancer risk: the odds ratio for breast cancer among women who exercise more than 3.4 hours per week was only 0.28. They concluded that implementation of a regular exercise program and a healthy life-style should be a high priority for young and adult women.

There are several explanations for the conflicting results. One issue relates to timing of the exercise. In several of the studies women were classified as "active" if they had participated in a university or college athletic program, and no regard was given to current or recent physical activity (23). In addition, differentiation between leisure time activity and occupational activity was not usually made. Moreover, in all studies, only one assessment of physical activity was conducted (1,6,17,23). As such, no association between the occurrence of the cancer and timing of the exercise program could be considered. Finally, and most importantly, the methodologies for quantifying physical exercise habits were different. For example, in the NHANES I study, subjects were asked only two questions regarding their exercise patterns ("In your usual day, aside from recreation, how active are you?" and "Do you get much exercise in things you do for recreation?"), and there were only three possible responses to these two questions (1): "very active, moderately active, or quite inactive". These limited data were then used to conclude that exercise showed little relation to cancer. A physician-administered questionnaire was used in 1954 for the Framingham Heart Study (17) to assess physical activity. Subjects rated the hours they spent sleeping, working and during leisure time as: sleep, sedentary, slight, moderate, or heavy activity. The hours reported were then multiplied by a specific energy expenditure value and summed to create an activity quotient. Approximately 26 years later this quotient was related to the occurrence of breast cancer with activity level. They concluded that exercise does not provide protection from breast cancer. In contrast, Bernstein et al. (6) interviewed subjects and obtained periodic lifetime histories of physical activities and then classified subjects according to the number of lifetime hours per week spent exercising. Thus, the Bernstein study had a far more comprehensive and quantitative measure of physical activity patterns than the other studies, and presented convincing evidence of a reduced breast cancer risk in physically active women.

Although additional studies will be required to confirm a protective effect of exercise, more recent data suggest an inverse association between physical activity levels and risk of breast cancer, despite confounding factors, such as body fat, body mass, and dietary patterns.

### **Musculoskeletal Disorders**

Musculoskeletal disorders, including low back and neck pain, rheumatologic diseases, and osteoporosis, limit the activity of people of all ages, and have been estimated to affect 10% of the population (32). Interestingly, exercise seems to confer some benefit in many of

these disorders. Three disorders that affect a large number of women are discussed next.

**Fibromyalgia**

Fibromyalgia (FM) is a painful condition involving primarily the musculoskeletal system (21,22,61,76). Other dominant features of FM include: compromised sleep patterns, fatigue, stiffness, subjective swelling, anxiety, and reactive depression. The cause(s) and pathophysiology of this commonly diagnosed disorder are poorly understood. When surveyed over the last decade, 5 to 7% of patients entering general practice clinics/centers report FM symptoms (21). Of those with FM, gender appears to be important; approximately 80 to 95% of all cases are women, typically between the ages of 30 and 60 years (21,61,76). More recent surveys show an increasing frequency and severity of FM. For example, a survey conducted on a population of young and middle-aged women in Norway found FM in 10.5% of the population (22). Wolfe et al (76) found that FM is also quite common in older persons and the prevalence actually increases with age; a greater than 7% prevalence was found in women between 60 and 79 (22,61,74).

Although a number of studies have provided evidence that FM may reflect a disturbance in neurotransmitter regulation (64), it has also been suggested that FM is a syndrome of physical deconditioning. Moldofsky et al. (51) found that induction of a distinct interruption of stage-4 sleep, characterized by alpha-wave intrusion into the normal delta rhythm, in normal volunteers produced symptoms similar to those of patients with FM. Surprisingly, disruption of stage-4 sleep in three highly conditioned men, who were included as subjects, did not provoke FM-like symptoms. This finding has led investigators to hypothesize that FM may not occur in persons who are physically conditioned. Although many potential aberrations in muscle metabolism and function have been sought, no discernible defects in muscle have been uncovered (46,61). However, the physical fitness levels of FM patients, including both aerobic capacity, flexibility, and muscle strength, are extremely low (41,43,44,45,46).

Interestingly, exercise in the form of moderate aerobic activity may be therapeutic. Mengshoel et al. (45) examined the effects of a 60-minute low-impact aerobic dance program twice a week for 20 weeks in women with FM. After the 20 weeks, all women in the exercise program felt that physical activity had increased their well-being, and most noted marked reductions in muscular tension. Nichols et al. (54) evaluated 17 women and 2 men with FM before and after an eight week program of walking 20 minutes a day, three days per week. After the eight weeks, those in the exercise group had lower ratings for pain and total symptoms as compared to before the exercise. Thus, cardiovascular or aerobic conditioning appears to confer significant benefit relative to improvements in pain threshold, aerobic fitness, and global health assessment scores of both the patient and physician in patients with FM (43,45). Further support for a beneficial effect of exercise is provided by the finding that in a survey of 52 patients with FM, 38.9% reported using some form of aerobic exercise as their primary mode of treatment (unpublished data). Other self-reported treatments included massage therapy (33%) and physical therapy (14%). Thus, it appears that both active and passive muscle activity may confer benefit for some FM patients.

In summary, exercise may assist in reducing the symptomatology and functional disability associated with FM, as well as improve fitness levels. Given that no other effective

treatments are currently available, this approach could be important. However, proper prescription and instruction as to the intensity, frequency and duration of the exercise are necessary. Further investigation will be required to determine the mechanism by which exercise modifies the pain and other symptoms associated with FM.

### **Rheumatoid Arthritis**

Rheumatoid arthritis (RA) is a chronic, systemic, autoimmune inflammatory disease believed to affect approximately 1% of the population (32); most of those affected are women. Many years ago patients with active RA were advised to rest and perform no physical activity since it was believed that such activities would serve to further damage their joints (67). However, current recommendations from the Arthritis Foundation include aerobic exercise when the inflammation is under control. Several studies conducted over the past years have clearly demonstrated that RA patients who participate in regular programs of aerobic exercise gain significantly in a variety of ways as compared to controls (19,28,33,49,55,60), with no adverse effects on joints. Physical benefits included improvements in muscle strength and joint flexibility, increased aerobic capacity, and less morning stiffness; psychological benefits included better self-esteem and less anxiety and depression. Furthermore, decreases in the number of sick days and days in the hospital, and a reduction in drug therapies have also been noted for RA patients after participation in an aerobic exercise program. In addition, it is important to note that in RA as well as in FM, depression is common. Despite uncertainty as to whether the depression is related to the severity of the disease/disorder or an independent coexistent problem, it appears that aerobic exercise helps to control the depressive and clinical symptoms associated with RA.

Although adequate physical fitness is an important component of overall health and work capacity, persons with RA, like those with FM, are usually deconditioned and have limited cardiorespiratory function and exercise tolerance. Minor et al (50) evaluated physical fitness and work capacity in a sample of women with RA before, after a 3 month supervised exercise program, and again after 12 months. Initial evaluations supported limited function and a generalized deconditioning in all subjects. However, subjects assigned to the supervised exercise group showed considerable improvement in their aerobic capacity and exercise tolerance after the 3 and 12 month evaluations. Moreover, consistently strong associations were noted among function and aerobic capacity. Such results need to be disseminated to the medical community so exercise can be promoted as a reasonable therapy for RA.

In addition to the cardiovascular benefits of exercise training, improvements in functional measures are often noted. Two forms of exercise that appear to confer significant benefit include dance- and water-based exercises. Noreau et al (56) demonstrated a 13% (to as much as 40%) overall improvement in aerobic capacity of RA patients who participated in a 12 week modified dance-based exercise program. Moreover, a decrease in the count of painful joints, and positive changes in depression, anxiety, fatigue and tension were demonstrated; no changes were noted in non-exercise controls. These improvements are impressive given that dance-based exercise is weight-bearing and provide further evidence that such activities are therapeutic. Similar improvements have been documented with



water-based exercises, as both observational and controlled trials have documented the safety and efficacy of aerobic exercise in a water environment for persons with arthritis (47).

Meyer et al. (47) recently compared demographic and disease characteristics of RA patients who participated in either community-based exercise programs or clinical programs. Disability, depression, anxiety, pain, global disease severity, and grip strength scores were gathered in both groups of RA patients. Global disease severity was significantly higher and grip strength significantly lower among non-participating patients as compared to water aerobic participants. Participants had been attending the exercise classes for varying time periods: from only one time to 22 years. Although it may be that those less severely affected by the disease are more likely to participate, it is equally possible that participants were less affected because of their regular exercise. These data reinforce the importance of identifying reasons why people attend the classes so that segments of the population not being served by community programs can be encouraged to attend. Interestingly, Gecht et al. (24) recently reported that among persons with RA, a strong belief in the benefits of exercise and higher self efficacy with respect to exercise were the primary determinants of participation. They also found that those with greater disease severity were less likely to exercise and suggested that these groups may need special encouragement to experience the benefits of exercise.

Whereas aerobic exercise appears to benefit persons with RA, only recently have investigators addressed the potential effects of resistance training (27,63). Rall et al. (63) presented evidence for RA subjects (ages 25 - 65 years) who participated in a 12 week high-intensity progressive resistance training program. They noted significant improvements in strength (54 to 75% increases), balance and gait scores, and 50 foot walking times, and reductions in self-reported pain and fatigue. As with the aerobic exercise, no changes in the number of painful or swollen joints were noted. These authors concluded that strength training is both feasible and safe in patients with well-controlled RA, but that medical examinations should be conducted to ensure no contraindications to resistance training are present (63). Given the short term nature of this study, as well as other studies, it will be important to evaluate RA subjects over an extended period to document long-term effects on functional status and other outcome measures.

In summary, after years of research it is now well established that persons with RA can participate in regular physical conditioning programs. Participation in such programs can significantly improve cardiovascular health and fitness, muscle strength and endurance, flexibility, function, and psychological status. The final answer on clinical improvements will require further study and may depend on: the severity of the disease; the mode, frequency, intensity and duration of the exercise; the biochemical profile of the patient; the compliance of the patient; and the duration of the disease.

### **Osteoporosis**

Osteoporosis, a disorder associated with aging, is characterized by extensive bone loss and places an individual at high risk for fractures. Osteoporosis affects a large percentage of women, some earlier in life than others and may be responsible for more than 1 million fractures each year in the United States alone (37). Although most common among postmenopausal women, osteoporosis is also seen in men and younger women. For example,



inactivity or immobilization are well-established secondary causes of osteoporosis. In addition, athletic women who become amenorrheic appear to be at high risk for bone loss (5,68). Because the incidence of osteoporosis has been increasing over the past several years, an effort to identify preventive and treatment strategies for optimizing bone mass has evolved. One preventive approach that has been used in the management of osteoporosis is regular physical activity.

A protective effect of exercise on the progression of osteoporosis has been demonstrated in numerous interventional and observational studies over the years. One of the few studies to examine the association between bone mineral density and physical activity patterns over a lifetime was recently reported by Greendale et al (26). They examined the relation between leisure time physical activity, bone mineral density, and osteoporotic fractures in a large cohort of women and men, and found that both current and lifetime exercise were protective in terms of maintaining bone mineral density of the hip. In contrast, exercise was not protective against osteoporotic fractures (26). Thus, many questions remain to be answered. For example, is there a critical time period for the exercise, and are there specific activities that optimize bone density? Cooper et al (13) recently demonstrated that one of the primary determinants of osteoporosis in women, peak bone mass, is significantly related to physical activity during childhood. Other studies support this finding (71). These data indicate that physical activity patterns during the early years modulate the mineral density of bone. Thus, efforts to maximize peak bone mass may be an important preventive strategy against the future development of osteoporosis.

In terms of specific activities, it has been shown that weight-bearing and/or impact exercises are essential for maintenance of bone mineral density (2,3). More recent data indicate that bone responds in a site-specific way to the mechanical stress of exercise, and for optimal bone responses, the stress to the area must be greater than that which normally occurs (3,13). Thus, the overload principle appears to be important, and was clearly demonstrated by Lee et al (37) in their study of young athletic women. These investigators examined bone mineral density in contralateral and regional sites of swimmers, volleyball, basketball, and soccer players, and moderately active and sedentary controls. They found marked site-specific differences in bone mineral density as a function of specific sports: volleyball and basketball players had higher arm, and volleyball, basketball, and soccer players had higher leg bone mineral densities as compared to the other groups. Given that this is one of the first studies to examine regional differences, and that the study was cross-sectional in nature, the findings must be interpreted with caution. However, such information will be important for developing exercise prescriptions to enhance bone mineral status. Finally, despite a need for more definitive studies, the ACSM in 1995 after reviewing currently available data, developed a Position Stand on Osteoporosis and Exercise (3) that applies to women. It is the position of the ACSM that:

- Weight-bearing physical activity is essential for the normal development and maintenance of a health skeleton. Activities focusing on muscle strength may also be beneficial, particularly for non-weight-bearing bones.
- Sedentary women may increase bone mass slightly by becoming more active but the primary benefit of the increased activity may be in avoiding the further loss of bone that

occurs with inactivity.

- Exercise cannot be recommended as a substitute for hormone replacement therapy at the time of menopause.
- The optimal program for older women would include activities that improve strength, flexibility, and coordination that may directly, but effectively, decrease the incidence of osteoporotic fractures by lessening the likelihood of falling.

Another issue relating to bone density is fractures from falls. Falls are the leading cause of injury-related deaths and hospitalizations in persons 65 and over, with women (approximately one in three) experiencing more falls than men (35,39,40). Recent studies suggest that inactivity, among other health and life-style factors, may be a significant risk factor associated with falls (35,39,40). Lord et al (40) investigated the effects of a 12 month program of regular exercise in women 60 to 85 on dynamic stability. Women assigned to the exercise group participated one hour twice weekly for 40 to 48 weeks; a warm-up, a conditioning, a stretching, and a cool-down period were part of each session. At the end of the trial, only those in the exercise group exhibited considerable improvement in balance range and coordinated stability tests. Because impaired stability has been associated with an increased risk of falling, the authors believe that physical activities to improve balance and stability may serve as an intervention for preventing falls. Thus, exercise may be important from several perspectives for osteoporosis.

### **Depression and Other Affective Disorders**

Major depression and anxiety are two of the most common disorders in the community, with adult women being affected approximately twice as often as men and also having higher rates of symptoms (9,12,18,25). Prevalence estimates for major depression range between 2 and 14% (9), and for generalized anxiety between 1 and 10% (18). Whereas the comorbidity between mental and physical illnesses may in part account for the higher rates among women, the prevalence of major depression and anxiety remains higher among women than men after adjusting for other diseases (18). As noted above in the sections on FM and RA, some of the symptoms of depression and anxiety associated with various disease states have been shown to be modified by physical activity. Moreover, the first National Health and Nutrition Examination Epidemiological Follow-up Study found that limited physical activity was associated with depressive symptoms (20). In fact, the use of regular exercise as a therapy for improving mental health is becoming increasingly more frequent (15,16,29,53). Many mental health scientists are convinced that both acute and chronic exercise are associated with improvements in mood and affect (14,29,53,57,62,70).

Exercise has been used in a number of different populations as a therapy to reduce depressive symptomatology: studies have included people with disabilities, various chronic diseases, and clinical depression per se. Coyle et al (14) studied persons with physical disabilities before and after a 12 week aerobic training program which involved either group or home-based exercise 2 to 4 times per week for 20 to 40 minutes. Subjects in the exercise group were predominantly women (86%) who had experienced a cerebral vascular accident or a spinal cord injury. At the end of the 12 weeks, persons in the exercise group reported a

59% decrease in symptoms of depression as compared to a 6% increase in symptoms of controls (14). Secondary benefits included a 23% improvement in aerobic fitness. They concluded that, despite limitations of the study, aerobic exercise may serve a causal role in modulating depressive symptoms. Stewart et al (70) evaluated patients over two years to determine whether levels of physical activity were associated with functioning and well-being. The patients (n= 2,471 with 60% women) were enrolled in a large national study, the Medical Outcomes Study, and had been diagnosed with various chronic diseases. Initial analyses indicated that physical activity was related primarily to indicators of physical health, but by two years, physical inactivity was strongly associated with psychological distress, depression, anxiety, and health distress. In addition, numerous studies have examined the role of exercise in the treatment of depression per se (14,57). Although the data are mixed, most studies indicate that physical activity may be associated with better mental health outcomes by reducing depressive symptomatology.

Other areas of interest with respect to mental health, but for which data are limited, include pregnant women, women with postpartum depression and the elderly. Koltyn presented evidence that exercise decreased state anxiety and depressive symptoms in pregnant women (34), and proposed that exercise may offer a useful non-pharmacological approach to controlling the mood changes associated with pregnancy. May (42) presented brief evidence that women who had postnatal depression, as indicated by a screening technique, had significant decreases in anxiety and depression following 12 sessions of moderate aerobic exercise. Finally, epidemiological data from an elderly population (65 - 84 years) in Finland indicated that while overall participation in physical activities decreased with aging, especially among women (65), self-rated meaningfulness of life and health by subjective measures were positively related to regular and strenuous physical activities (65). Moreover, depressive symptoms were found to be negatively related to physical exercise. It appears that involvement in physical activities by positively affecting psychological well-being, may in fact promote a higher quality of life. However, it is equally likely that a healthy psychological outlook is important for staying physically active.

### **Summary**

In summary, the available evidence indicates that there is an inverse association between physical activity and a variety of chronic diseases. Moreover, physical activity appears to influence psychological well-being. Aerobic exercise is the modality most frequently studied, and appears to confer positive changes, but other forms of exercise may prove to be equally beneficial. However, the appropriate duration, intensity and frequency of the exercise have not been determined for any of these chronic health problems and must be considered so global recommendations can be offered. Importantly, efforts to promote physical activity within the community, schools, and homes must be initiated to achieve the goals set for in Healthy People 2000, so the health of our women can improve. Future studies will be required to identify mechanisms whereby physical activity confers benefit.

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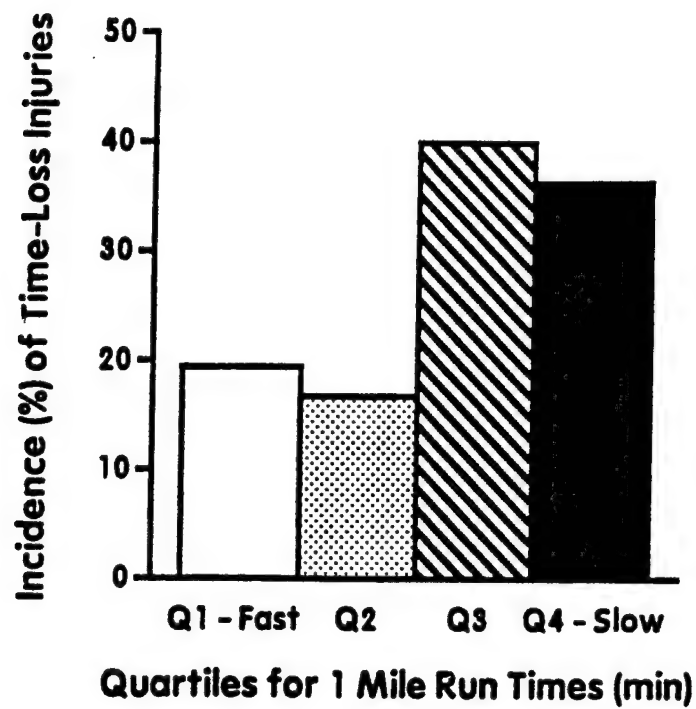


Figure 1.

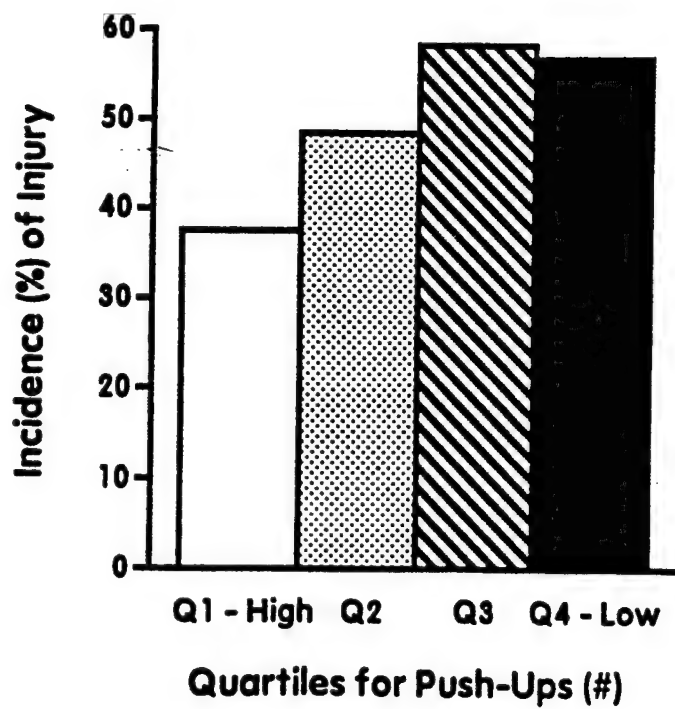
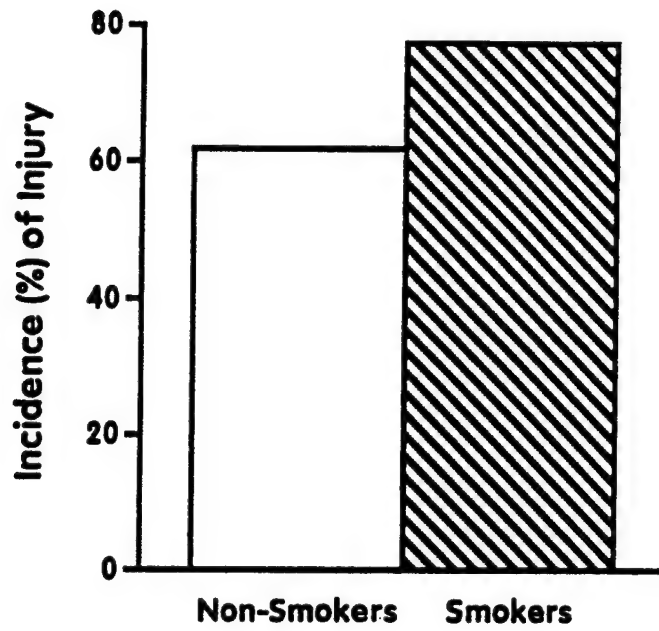


Figure 2.



**Figure 5.**



**Figure 6.**

## **The Active Duty Wife and Mother: Special Concerns for Women's Health**

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### **Introduction**

Mady Segal (1986), a sociologist specializing in the study of military women and military families, has described the military and the family as "greedy institutions." Both of these institutions are "greedy" in that they place a high number of demands on their members and require a great deal of sacrifice from them. These two institutions compete for the time, resources and loyalty of their members, with their goals, demands, and requirements often in conflict with each other. Members of both institutions must somehow organize their lives so as not to allow discord between the institutions and instead find a "fit" between the two. In the past, this has meant for many soldiers a separation between the two; however, keeping family and military life has not really been possible, especially for women. With the military's recognition of the link between the organization and the family, and especially of how each affects the other, the relationship between the military and the family has grown to be seen more as a relationship based on interdependence and cooperation than of competition.

For women in particular, the dilemma between work and family has been studied extensively in the social sciences. It is generally accepted that the family is "greedier" for women than for men, since women are most often the primary caretaker of the home and the primary caregiver to the children. Indeed, one need only look at a recent Census Bureau report (current population series report P70 no.53, "Who's Minding Our Preschoolers?") to see the lack of primary child care provided by fathers. This is especially problematic for military women on active duty because their work responsibilities tend to be greater and the demands placed on them more extreme than their civilian counterparts. For many women, a demanding career in the military and a satisfying family life as a wife and mother are extremely difficult to accomplish successfully.

The stressors and strains placed on women who work outside the home are well-documented, and it is not necessary to list them all here. Instead, the focus will be on the stressors particular to active duty wives and mothers. The individual stressors may not be unique to the military women, but few (if any) occupations or professions have the combination of them all. In this paper, the stressors identified as having potential negative health (both physical and mental) consequences for active duty women include health care during pregnancy; health care for children; spousal abuse; child abuse; pregnancy and work-related issues (such as "convalescence" leave and physical training during pregnancy); issues relating to mothers of infants and small children (such as breastfeeding, deployment, and parenting arrangements); child care; elder care; and work and living

arrangements for special populations (single-parent families, dual-career families and dual-military families).

### **Demographics**

The military is not immune from the family pattern trends in the society at large; indeed, the changing demographics of the military family reflect these trends in much the same way that the population at large is experiencing them. When the military was (almost) exclusively male and unmarried (at least at the enlisted and lower officer grades), the demographic makeup of the military family was simple: it was either non-existent, not recognized, or the "traditional" nuclear family of a working father, stay-at-home mother, and children. Much has changed since enlisted personnel were allowed to marry, women were permitted to serve, and women who were married and had children were not automatically discharged (Holm 1992). Using data from the 1992 Department of Defense Surveys of Officers and Enlisted Personnel and Their Spouses (Department of Defense 1994a), this section provides an overview of the different types of family patterns experienced by active duty women, and the prevalence of these types.<sup>1</sup>

Today's military is largely a married military, with 62.6% of military personnel married. 63.6% of male military members are married, compared to 51.7% of female military members. The highest percentage of married personnel are found in the upper enlisted and officer grades (E7-E9 and O4+). The Air Force is the branch with the highest percentage of married members (67.8) and the Marines have the lowest (52.6).

Military women are more likely than men to have been married more than once (24.7% to 17.3%) and for a shorter length of time than men (61.1% of women have been married 5 years or less, compared to 45.5% of men). The percentage of military women who have experienced a divorce (40.5%) is almost twice as high as military men (24.1%). Military women are much more likely to be married to another military person (53.8%) than are military men (7.3%). In general, 7.6% of all military personnel are in joint-military marriages/families, 85.5% of which are marriages between active duty members. Joint-service couples in the Air Force have the highest percentage of living together (91.7%) of all the branches, and the Marines have the lowest number living together (75.2%). 56.8% of joint-service couples have children, and of these families, 88.3% have children under the age of 13 living with them.

A military member married to a civilian is the most common family type (53.5%), and 79.1% of these families have children. 5.5% of military personnel are single parents, and single parents in the military are more often women (63.9%) than men (36.1%). Single parents are more often found in the lower enlisted grades (40.6% in E1-E4; 40.2%

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<sup>1</sup> The absence of demographic information by race is an unintended omission. Unfortunately, the data were not analyzed by race (except in the very broad scope of absolute numbers of members in each racial category by branch of service). Had the information of family type by race been presented in the DoD survey analysis, it most surely would have presented here.

in E5-E6) than in the upper enlisted grades and officer corps (11.9% in E7-E9; 7.3% in the officer corps). Most single parents (52.1%) have children under the age of six.

Overall, 6.5% of military personnel report having elderly dependents (aged 65 and above), and 8.2% report having responsibility for elderly relatives. 5.1% of military members report having children as well as elderly/other dependents. Having elderly dependents is more common in the upper enlisted and officer grades (12.% in E7-E9; 14.3% in O4+). Military women are more likely than military men to have elderly dependents (14.6% to 5.8%) or responsibility for elderly relatives (10.2% to 8.0%). Social science researchers have found that women comprise approximately 85% of caregivers to elderly family members (Medjuck et.al. 1992). In the same way that society has expected (and demanded) women to be caregivers of children, it has put the onus of responsibility for the elderly on women as well; this has led to what some have termed an "invisible burden" for women since much of the work of caregiving occurs in the home and is basically unnoticed (Wuest 1994).

### **Special Populations: Single Parents and Dual-Career Couples**

Single parents have unique needs with regard to the strain between work and family. There is a large volume of literature documenting the experiences and strains and stressors of single parents in civilian society. David Wright (1989) examines the literature on the relationship between work and family for single parents in the military. Single parents who are in the military face many of the same strains and stressors as civilian single parents, including role strain, child care issues, and lack of discretionary time. However, the military does pose some unique stressors for its single parent members, while at the same time alleviating some of the problems civilian single parents face.

Civilian single parents often experience a reduction in their income after marital disruption (divorce, separation, death of spouse). If the single parents were never married to begin with, then their income situation still is hurt by the financial burden of supporting a child on one income. In the military, income-related problems may be less severe than in the civilian workforce because of the military's equitable pay and benefit structure and job security. Still, financial strain may be present, especially among the lower enlisted ranks, because of the cost of child care expenses, especially child care requiring over 40 hours per week.

Child care remains perhaps the most problematic issue for single parents both in the civilian and military communities. Military posts often have on-site child care, but single parents often need quality child care that offers convenience and flexibility at a reasonable cost. In addition, for military single parents, deployments and work-related travel pose unique problems for child care arrangements. Temporary duty assignments (TDYs) may on average only be ten days, but finding 'round the clock child care for ten days can be problematic and expensive. In addition, the frequent number of relocations many service members experience may be especially difficult for single parents, who must manage the move and relocation by themselves, while at the same time caring for a child and searching the new location for an acceptable child care arrangement. Continually changing child care arrangements is not only difficult on the parents, but on the children

as well.

The service branches all have a variety of family support programs that serve to aid families and may be of great assistance to single parents. However, there is a lack of awareness to these programs among single parents, and participation in these programs is low (Bowen and Orthner 1986).

Dual-career couples are another population with special needs. Dual-career couples are couples in which both spouses are involved in maintaining their own careers. For some, one spouse will enjoy a career in the military and one spouse will cultivate a career in the civilian workforce. For others, both spouses will be involved in the military ("dual-service couples"), although not necessarily in the same branch of service.

The biggest issues for both of these types of couples are role overload, child care arrangements, living arrangements (whether or not their jobs are co-located) and relocations (Janofsky 1989). Role overload occurs because both spouses have roles outside the home and roles within the home, and the conflict between the two often affects women more seriously than men. Women have traditionally been assigned responsibility for the day-to-day running of the household, and when they are pursuing a career (or even just a job), they often lack the time and resources to fulfill their household duties to meet their or their spouses' expectations. Management of the daily household activities either becomes shared by husbands and/or children, given to a hired provider (cleaning person, etc.), or is done as a "second shift" by the woman (Hochschild 1989).

Barbara Janofsky (1989) reviews the literature on dual-service couples and finds that it is the military women in these relationships who suffer the most and are most likely to give up their careers. Even living together may be difficult if their assignments are not co-located. Much of the stress is also due to the lack of suitable child care arrangements (extra-long hours, flexible scheduling, availability during emergency deployments for extended periods of time, etc.) and the lack of military policies that allow for women to take time off (more than the short time accorded after pregnancy) to attend to their families. Janofsky (1989: 100) writes, "A disproportionate number of dual military members do not re-enlist because of family separations and the stress it places on the family...Usually it is the woman who chooses to leave the service and take more responsibility for the family...[and] in many cases, the military services lose the best servicemember in the wife's decision not to re-enlist."

### **Policies and Procedures Particular to Active Duty Wives and Mothers<sup>2</sup>**

The policies of the armed services that perhaps most affect active duty women are those surrounding pregnancy and childbirth. In the military, there is no such thing as "maternity leave." Instead, the leave associated with pregnancy and childbirth falls under "convalescence leave." The amount of leave accorded to each woman varies by service;

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<sup>2</sup> Information on the policies presented here was obtained through telephone interviews with personnel representatives for each service stationed at the Pentagon (or in Washington, DC, in the case of the Coast Guard).



leave granted after an uncomplicated delivery is four weeks in the Army, 42 days in the Navy and Marines, and 45 days in the Air Force. No special leave is granted after an adoption, although each service allows for the use of regular (vacation) leave for this purpose. And no leave other than regular leave is granted to fathers after the birth of their children.

No branch of service has a standard policy on the length of hospital stays after vaginal or caesarian deliveries, although the average is up to two days for a vaginal delivery and three to five days after a C-section. These stays are left up to the discretion of the physician and to a lesser degree, the woman herself (some women may negotiate longer or shorter stays depending on extenuating circumstances or special situations at home).

For the special needs baby, one who is sent to the Neonatal Infant Care Unit (NICU), there is no one policy regulating the leave granted to or consideration for the parents. Regular leave may be used to remain with a special needs baby after the convalescence leave has ended, and in some cases a special case of temporary duty (TDY) is assigned to allow the service member to remain with the child. In general, consideration is given to the parents of a special needs infant in terms of duty assignment, work schedule and rotation, etc.

During Operation Desert Storm, much attention in the media was paid to the deployment of breastfeeding mothers and mothers of young infants/children. Although some have argued for a change in the policies of the armed forces for the nondeployment of women with young infants (especially those women who are still breastfeeding), no such policy has been developed. In the Navy, women are even eligible for sea duty assignment four months after delivery.

Although the Coast Guard is not typically included with analysis of the armed forces since it falls under the Department of Transportation in peacetime, its policies for pregnant women and parents is included here for comparison. The Coast Guard uses DoD hospitals for pregnancy and delivery, so the DoD policies and procedures pertaining to delivery and postpartum care are applicable to Coast Guard personnel as well. But the personnel policies for pregnancy and parenthood are different from the other armed forces. Leave after an uncomplicated delivery is similar to the other services at 45 days. However, if a woman was assigned sea duty when she became pregnant, she has up to six months before she must return to sea duty. If a baby is sent to the NICU, he or she is immediately enrolled in the Coast Guard's Special Needs Program, which grants special considerations to the parents of the child with regard to transfers, units, locations, duty assignment, and leave granted. However, the most interesting difference between the Coast Guard and the DoD services is that the Coast Guard has a Separation for the Care of a Newborn Policy that has been in effect since 1993. This policy allows up to *two years* leave for *either a mother or father* after the birth or adoption of a child. Coast Guard members are guaranteed re-admission at the rank and pay grade they held when they took leave. This leave of up to two years is designed not to hinder or be detrimental to one's career progression, and although the program is very young, Coast Guard personnel report high levels of satisfaction with the program.

There are other policies that affect active duty wives and mothers besides those

relating to pregnancy. These include co-location for dual-career and dual-military couples, parent/work role harmony, and child care programs. Dual-career and dual-military couples were discussed earlier. Parent/work role harmony includes policies and practices that allow service members to be both a parent and a soldier, such as flextime. Flextime, and flexible leave options, are often executed at the unit level. Different occupations, specialties, and units offer differing levels of flexibility for their members. However, in general, the military can be very accommodating to parents when they need time off to appear at a parent-teacher conference, take a child to a doctor's appointment, or attend a school play. What is not known is how often service members take advantage of flexible scheduling, and whether or not making use of these option affects them professionally. In the civilian labor market, many women feel pressure from coworkers to put their job ahead of any "trivial" family needs; in other words, they feel they need to continually prove their merit as a worker, sometimes at the expense of family commitments (see the work of Rosabeth Moss Kanter). Whether or not this is also true in the military probably depends on the woman's job, unit, and branch of service.

Child care continues to be a major concern for active duty mothers. In Operations Desert Shield and Desert Storm, the problem with deployment cited most frequently was "dependent care considerations," with women more likely than men to report it as a problem (Department of Defense 1994b). A female single parent family was the family type which was most likely to report dependent care as a problem with the deployment.

The 1992 DoD (1994c) Survey of Officers and Enlisted Personnel and Their Spouses included a supplement on child care. For female service members, the primary caretaker of the child/ren was a school or day care center (48.4%). 52.1% of service women and 51.1% of those in dual-service marriages required extended child care (over 40 hours per week), and 30.5% of military members in the lowest pay grades (E1-E4 and O1-O3) needed extended child care.

An increasing reliance on day care facilities is evident. In the military, 14.9% of children less than one year old, 23.4% of children between one and two years old, and 34.5% of children between two and five years old are cared for in day care centers (or day care homes, licensed and unlicensed) or preschools. 11.8% of children less than one year old and 18.9% of children between the ages of one and two are cared for in an on-post day care center. 59.8% of off-base child care is performed outside the child's home, and 57.9% of on-base child care is performed outside the child's home.

One other finding of interest of the survey is that military women are much less confident than military men about their spouses handling child care and their spouses' parenting abilities while they are absent.

### ***Healthy People 2000 And Other Health Goals***

In 1990, the U.S. Department of Health and Human Services (DHHS) released its *Healthy People 2000: National Health Promotion and Disease Prevention Objectives*. DHHS (1993) has published a series of annual profiles tracking the nation's health goals for the year 2000. This section identifies the goals set in the report that pertain to healthy wives and mothers, and shows how close the civilian population is in accomplishing the

targets set. The military data, when known, is also examined as to whether or not it is in compliance with the goals and standards identified in the report, since the Department of Defense (DoD) has officially stated that it is involved in the *Healthy People 2000* program. (A speaker will present the military's current situation with regard to these goals at the conference.) In addition, the health care system in the United States has been scrutinized by various feminist organizations and women's health care advocates. Recommendations for implementing strategies designed to

better the health care women receive are offered and compared with the military's standards for women's health care.

The target infant mortality rate for the year 2000 is 7 per 1000 live births. In 1990, the civilian population reported an infant mortality rate of 9.2/1000 live births; in 1991, the figure was 8.9/1000 live births. The fetal death rate is targeted to be 5 per 1000 live births and fetal deaths in the year 2000. The civilian population reported 7.5/1000 live births in 1990.

The target set for maternal mortality rates per 1000 live births is 3.3; the civilian population had a rate of 8.2/1000 live births in 1990. The recommended weight gain during pregnancy was reached by 75% of civilian women in 1990, with the target set for 85% by the year 2000. The 2000 target for women receiving prenatal care in the first trimester was 90% (of all live births). The civilian rate in 1990 was 75.8%. The 1995 Department of Defense Survey of Health Related Behaviors reported that 80% of military women who were pregnant within the past five years had received prenatal care in the first trimester.

The number of infants afflicted with fetal alcohol syndrome is targeted to be .12 per 1000 live births in the year 2000. In 1990, the civilian rate was .41/1000 live births. In 1990, the percentage of infants born with low birth weight was 7.0% in the civilian population; the 2000 target is 5.0%. The 2000 target for infants born with very low birth weight is 1.0%; in 1990, the civilian rate was 1.3%. The 2000 target for percent of newborns screened for genetic disorders (and other diseases) is 95%. No civilian data was available.

The overall C-section rate in the civilian population was 23.5 per 100 deliveries in 1990 and 1991; the target for the year 2000 is 15/100 deliveries. For primary (first time) c-sections, the civilian rates were 16.8/100 deliveries in 1990 and 17.1/100 deliveries in 1991. The 2000 target is set at 12/100 deliveries. For repeat c-sections, the civilian rate was 79.6 per 100 deliveries (among women with a previous c-section) in 1990 and 75.8/100 deliveries in 1991. The 2000 target is 65/100 deliveries.

The report also identified goals for breastfeeding: 75% of all mothers breastfeeding in the early post-partum period, and 50% at 5-6 months after delivery. The 1991 civilian rate was 53% in the early post-partum period and 18% at 5-6 months post-partum.

Iron deficiency, which is related to poverty and poor nutrition, is targeted to be 3% for children 1-4 in the year 2000, and 3% for women of childbearing age. No civilian data was available. The U.S. Army Institute of Environmental Medicine is currently undergoing a study on this issue, "Assessment of Iron Status and Dietary Intake of Female

Army Soldiers." This is a goal which can easily be reached through the use of programs like the Special Supplemental Food Program for Women, Infants and Children (WIC), currently available to qualifying service members serving in the U.S. A policy issue discussed later will be the unavailability of WIC to service members stationed overseas. This is important because those eligible for WIC are those most likely to be unable to afford a proper nutritional diet for themselves and their children, especially if they are living off the economy in a country like Germany or Japan. The Department of Defense (1996) is currently seeking to extend this program to the military women and military wives (and their children) stationed overseas.

The 2000 targets for children receiving the basic immunization series are 90% of children 2 and under, and 95% of children in school (kindergarten through post-secondary). The civilian population had a 1991 rate of 37% for children 2 and under and 96-98% for children in school.

*Healthy People 2000* also lists targets related to violence against women and children. Spousal abuse in the civilian population was 30.0 per 1000 couples in 1987; the 2000 target is 27.0/1000 couples (the report specifically identifies abuse of women by male partners). Child abuse and neglect, in general, is targeted to be less than 25.2 per 1000 in 2000; in 1987, the civilian rate was 25.7/1000. Child abuse and neglect was divided up into different types of maltreatment. For physical abuse, the 1987 civilian rate was 5.7/1000, and the 2000 target is less than 5.7/1000. For neglect, the civilian rate was 15.9/1000 in 1987; the 2000 target is less than 15.9/1000. In general, research on the rate of child abuse among military members has been shown to be at or below the rate of the civilian community (Dubanoski 1981; Dubanoski and McIntosh 1984). In 1994, the military (all branches) had 10,436 cases of substantiated child abuse (including neglect) out of 21,292 reported cases. These numbers compute to rates of 1.2/1000 for substantiated child abuse and neglect, and 2.4/1000 for reported child abuse and neglect. For spousal abuse, 17,584 claims were substantiated out of 24,412 reported cases in 1994. This computes to 1.2/1000 for substantiated spousal abuse cases, and 2.5/1000 for reported spousal abuse cases.

The military has taken many measures to insure that its women and children are protected from violence. Aside from establishing programs and centers on post to deal with spousal and child abuse, the military services work with civilian agencies in obtaining as much assistance as possible for victims of abuse as well as counseling and other forms of help for the abusers themselves. Two programs of note are the U.S. Navy Family Advocacy Program, which developed a model of risk assessment used to identify families in need, and the DoD New Parent Support Program, which offers a variety of assistance to new and "at risk" families including counseling and home visits.

An agenda for women's health is currently being set by leading women's health care advocates and organizations. The psycho-metric paradigm which dominated the field of health care in the United States is shifting to one which is more patient-centered and holistic and less paternalistic and invasive. As Michelle Harrison (1994: 80) writes, "Medicine, as a specialty, was founded on the model of a male body, with woman as

'other'." Women's health care advocates have been urging women to take back control of their bodies and their health from the medical establishment, which has often at best ignored women's health concerns (for example, the exclusion of women and gender bias in medical research and clinical trials--see Rosser 1994 and Oberman 1994) and, at the very worst, abused the women under their care (for example, see Behar 1994; Dreifus 1984; and Lopez 1987 regarding the forced sterilization of Latina women).

This focus on centering women in the health care field has resulted in several recommendations pertinent to women as wives and mothers. Many of these deal with the issue of pregnancy. Pregnancy, it is argued, is to be treated as a natural, normal state and not an illness or a disability. Calling maternity leave (what it is called in civilian society) "convalescence" leave in the military is a bit of a misnomer; while certainly there is a recovery period from giving birth, "convalescence" connotes a sense of healing from a physical disability rather than the normal recovery and *bonding* process that follows most deliveries.

First and foremost, women's health advocates champion health policies that offer universal coverage and comprehensive benefits with a high quality of care and health promotion and planning. In addition, these benefits must be accessible to women. The military does have comprehensive health benefits for women, with all women under its umbrella covered. In addition, active duty women have an extremely high rate of receiving mammograms and pap smears at recommended intervals (Department of Defense 1995). "Well Woman Clinics" have been established throughout the services, and offer after-hours and weekend appointments, making these clinics more accessible to women (especially wives and mothers) than more traditional health care settings.

A variety of options for pregnancy and delivery are recommended, including the use of nurse-practitioners, nurse-midwives, and doumas (special delivery coaches); the availability of pain medication and pain prevention methods; the availability of a variety of birthing options, including hospital deliveries, home deliveries, and birthing centers; and an emphasis on non-invasive procedures, such as a declining use of forceps-assisted (vacuum extractors, etc.) deliveries, labor-inducing drugs and procedures (like pitocin, surgically breaking the bag of waters before the woman is in labor, topical medications to dilate the cervix, etc.), and an increasing number of VBACs (vaginal births after caesarian). Currently, the military services do not sanction the use of non-hospital deliveries, and the use of midwives and/or doumas, if permitted at the particular hospital, is at the patient's expense. To its credit, the Department of Defense established in 1994 a Defense Women's Health Research Project which directs funding to research according to the recommendations proposed by the National Academy of Science's Institute of Medicine. Two current research projects focus on access to and delivery of health care to women and the impact of sexual harassment and gender bias on active duty women's psychological and physical health. In addition, the Air Force Reproductive Hazards Initiative Group at Brooks Air Force Base in Texas is publishing a technical report on the guidelines for handling reproductive concerns in the workplace, specifically workplaces with conditions which may be hazardous to pregnant women and their fetuses.



## **Policy Issues and Concerns**

Active duty wives and mothers are affected by military policies both directly and indirectly, and while the military has made an effort to address many of the concerns of these women, current issues still need to be confronted.

The leave granted women after pregnancy is relatively short by American corporate standards (usually at least eight weeks, often twelve to sixteen) and exceedingly short by most European standards (many countries allow up to a year of paid leave). Since the military branches have no policies of nondeployment of breastfeeding mothers, mothers who may want to breastfeed their children may be forced to wean their children early and quickly if called away to duty. In addition, although breastfeeding is encouraged at DoD hospitals and by DoD health care professionals, once back in the field or with one's unit, continued breastfeeding of children may be exceedingly difficult if not impossible.

Facilitating healthy mothers and babies is (or at least should be) a goal of the armed forces. However, healthy motherhood means more than just a healthy pregnancy (something the military is successful at achieving for most of its population). The service branches are working toward making the military a more congenial place for military women to be mothers, and programs such as the New Parent Support Program are steps in reaching that goal. Carolyn Becraft's "fatherhood initiative" is another way in which DoD is focusing on the family as the unit of analysis instead of just directing its attention to the service member and treating family members as financial "dependents."

Other concerns for the military community involve the children of military women. Since women are usually the primary caretakers of children, policies and programs that affect the children of military personnel also affect military wives and mothers. Obtaining WIC overseas remains a current issue, since having WIC stateside has resulted in low income mothers and children receiving food supplements that improve their health.

The universal and comprehensive health care offered by the military does benefit military women and children. However, for various reasons, the number of well-child visits at the recommended intervals for military children may not be achieved. Still, the health services do exist for those in need. And for those in need of special care, like special needs babies, the military leaves much up to the discretion of the supervisors at the unit level. Therefore, active duty mothers may be granted much flexibility in their work responsibilities and schedules so that they are able to direct their attention to their children.

The military is recognizing that it must face the needs and wants of its *families* if it is to continue to attract America's "best and brightest" and keep its valued force. By working on issues related to families such as co-location for dual-service and dual-career couples, child care arrangements, and family support services, the military is taking an active role in making it a positive environment for the active duty wife and mother.

## **Summary**

The increasing number of women in the military, especially married women and mothers, is forcing the military to accommodate populations it did not have to deal with in the past. The military community has responded by instigating programs that address the



needs of active duty wives and mothers, especially with regard to family support, health care, and available child care facilities. However, many policy questions remain that pertain to military women, including several mentioned in this paper (i.e. nondeployment of breastfeeding women or mothers of small infants; treating the family as the unit of analysis and not just the service member; and providing programs such as WIC and Head/Sure Start to its members).

The military cannot ignore the needs of active duty wives and mothers, and must respond to the variety of situations faced by this population (such as the need for co-location by dual-career and dual-service couples and the need for more geographic stability for families, especially single parents). In addition, the future needs of these women need to be addressed, such as caring for elderly relatives. The targets set by the *Healthy People 2000* report need to met to the best of the military's ability, and child care arrangements need to be examined to ensure that the needs of parents with children in need of care can be met. By focusing on the families of its service members, especially the special situations faced by active duty women, the health of active duty wives and mothers will be protected and improved.

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*The Uniformed Services University of the Health Sciences*

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Evaluation Summary



*Compiled by 1LT Tim Osbon, MS, USA*  
*USUHS - Continuing Education for Health Professionals*

## Forum on the Health of Women in the Military

June 17 - 19, 1996

### Demographics of Participants receiving educational credit:

- 32 Physicians received 16.0 credit hours in Category 1 of the Physician's Recognition Award of the American Medical Association with the following statement on the certificate:

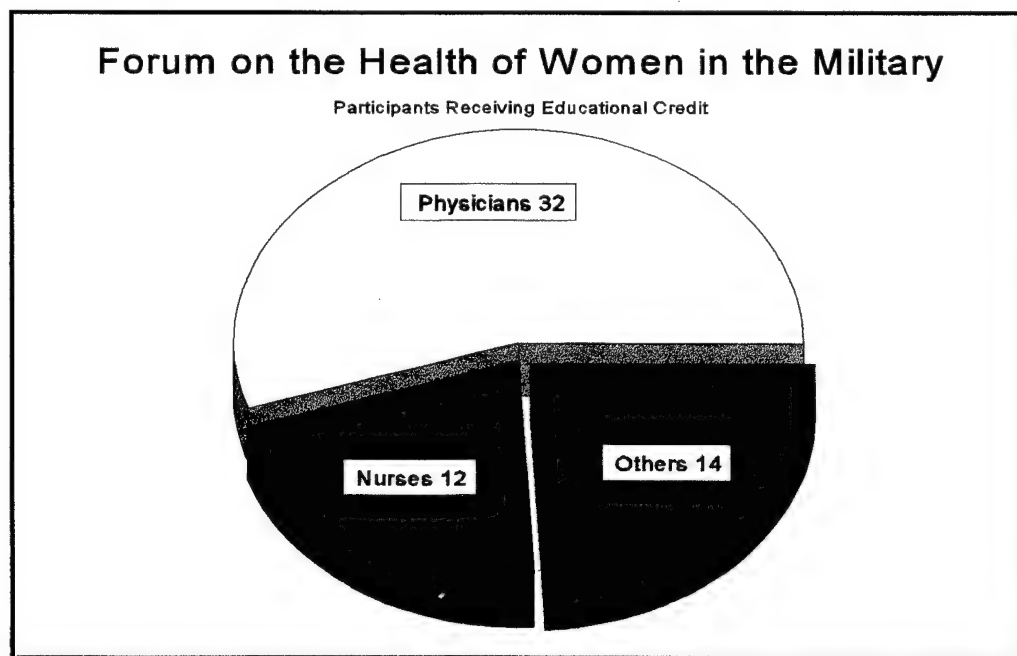
**"USUHS designates this continuing medical education activity for 16.0 credit hours in Category 1 of the Physician's Recognition Award of the American Medical Association."**

- 12 Nurses received 18.2 nursing contact hours with the following statement on the certificate:

**"This offering for 18.2 contact hours is sponsored by the Uniformed Services University of the Health Sciences (USUHS), which is accredited as a provider of continuing education in nursing by the American Nurses Credentialing Center's Commission on Accreditation."**

- 14 Others received 16.0 hours of continuing education credit with the following statement on the certificate:

**"General continuing education credit is awarded to non-physicians and non-nurses attending educational activities that have met the criteria set forth by the Accreditation Council for Continuing Medical Education and/or the American Nurses Credentialing Center's Commission on Accreditation."**





UNIFORMED SERVICES UNIVERSITY OF THE HEALTH SCIENCES

4301 JONES BRIDGE ROAD  
BETHESDA, MARYLAND 20814-4799

August 21, 1996



Office of Continuing Education  
for Health Professionals  
301/DSN 295-3106  
800-772 1728  
FAX 301/DSN 295-3110


MEMORANDUM FOR THE RECORD

SUBJECT: The Forum on Health of Women in the Military

CDR Omer discussed with the University's Continuing Nursing Education Advisory Council the attendance problem at the 1996 Forum. They listed the following resources and contacts for mailing lists and promotional support, should future iterations be planned:

Women Officers Professional Association  
Uniformed Nurse Practitioner Program  
Special Interest Group for Ambulatory Care  
AOHN  
Navy Nurse Corps Association  
Air Force Association Magazine  
Military Medicine Magazine  
Air Force Consultant's List  
Air Force Nurse Corps Data Base  
Army Nurse Consultants List

The Office of Continuing Education for Health Professionals will compile mailing lists for the organizations listed for future iterations.

  
CDR Laura P. Omer, NC, USN  
Director





# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Overall - Additional Comments:

- Coordinate conference schedule to follow Annual Women's Health Congress and build on its agenda, goals, and content.
- Could not get a room at the recommended hotels.
- Excellent program - I hope it will be an annual event.
- Excellent program overall
- Facility was very conducive to learning.
- Great info presented on past issues and resolution. You can always learn from the history.
- How come a military institution is charging such a steep course fee?
- It's unfortunate that the audience wasn't larger. As the Special Assistant for Women's Health in the Navy, I didn't receive an invitation. The only person I knew that was invited was the head of the Navy Nurse Corps.
- More breaks! Super break snacks, drinks. Thanks!
- Need copies of all presenter's slides or notes.
- Need more advance notice of conference. Need to advertise goals of dinner speaker and encourage attendance.
- Need better shuttle instructions from the Metro to the conference.
- Program should be four days. (X2)
- Registration fee very reasonable.

## Most Important Thing Learned From This Program:

- Clarification of pregnancy issues in policy decisions.
- Constructive Advocacy process.
- In order to solve these issues, it can't stop at statistics but needs to go forward into action from ideas, recommendations that are presented here.
- I think it was really exciting to be a participant at this ground breaking conference.
- Key women's health issues, need to take data and initiate (through group work) development of policy. Need to be concerned about how this data may be interpreted and used against women.
- OB/GYN issues related to deployment.
- Policy issues and the level where they're decided with possibly minimal input from those it affects most.
- Readiness and training issues for women in the military.
- Scope of nutritional problems for women.
- The need for intra service communications.
- The issue of special issues in women's health is being ignored by most.
- There are some people that do care about women in the military, but the policies aren't enforced at all levels.

## Liked Best About This Program:

- Carolyn Becraft, BG Foote - instruments to effect change.
- Coordination of lectures. Always good to have a book vendor.
- Focus on women's issues specific to population.
- Format - short lectures on related topics followed by panel discussions was very effective in stimulating questions!
- Learning about other disciplines related to women's health.
- Meeting the people.
- Multidisciplinary approach to a multidisciplinary problem of women's health.
- Networking - some excellent lectures.
- Opportunity to see where the policies come from and how they came to be.
- Quality of most of the presentations. CDR Moore was particularly excellent !!
- Question and answer periods - truly allowed time for all participants adequate time for all participants to make comments.
- Range.

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Liked Best About This Program (cont'd):

- That someone is finally taking the health of military women seriously.
- The topics were excellent. Need more enlisted NCOs that are actually involved with the enlisted personnel that are presented with most of the problems discussed.
- The nutrition info.
- Very research-based presentations; comprehensive and pertinent content.

## Liked Least About This Program:

- Awareness of this program did not get to the senior NCO level. These NCOs are the ones that deal with soldiers on a day to day basis. The Commands are made aware of most problems through the NCO and enlisted people.
- I wish the flyers were disseminated earlier.
- Low attendance.
- Some speakers did not have handouts or papers.
- Some of the presentations were not generalizable to problems of current needs of MHSS.
- Specific GYN therapies.
- The nutrition presentations - not enough recommendations.
- The quality of some databases.
- The way this meeting was promoted needs to be better.
- Too much nutrition on last day.

## Suggestions For The Future:

- A senior NCO should be asked to speak at the next conference.
- Distribute program info to the Women Veteran coordinators at each VA hospital.
- Ergonomics and military women - LTC Valerie Rice, USA.
- Female stressors: sexual harassment, role discrimination, physical fitness injuries, mental health.
- Health versus Readiness. Proactive approaches. Health behaviors.
- Health Promotion programs we can do for our active duty women.
- How to get the word out on emergency contraception.
- Iron nutrition and performance - LTC Alana Cline, USA.
- Keep it going !!
- Look at parenting issues.
- More sports medicine.
- Need to more adequately represent all the services - several Navy and Army speakers but limited Air Force. This is important when talking about deployment.
- Osteoporosis.
- Perhaps more input from the line community on how we can best interface with commands to address many of the issues presented.
- Policy formation regarding postpartum and breast feeding.
- Pregnancy policy: DoD civilians, military leaders, service members, scientists, educators, medical professionals, etc.
- Presentations dealing with the effect of shift work on women's health especially menstrual cycle, fertility, pregnancy.
- Providing support to refugee women in humanitarian missions.
- Representatives from OTSG for policy issues.
- Reproductive endocrinology.
- Review results of conference breakout groups' comments, research and presentations which merit follow up. Solicit input from Chief Nurse of each service. Incorporate Healthy People 2000 objectives and Clinician's Handbook of Preventive Services objectives.
- Would like to see a PHS speaker present issues of emergency PHS field support in humanitarian missions in CONUS and OCONUS.

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## OVERALL PROGRAM EVALUATION

ITEMS EVALUATED	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score
	1	2	3	4	5		
1. The program was well organized, using the scheduled time efficiently.	0	0	0	10	19	29	4.66
2. The program provided practical, useful information.	0	0	1	11	21	33	4.61
3. The sequence of the program facilitated learning.	0	0	0	9	23	32	4.72
4. The program was up-to-date in terms of current practice and issues.	0	0	1	10	22	33	4.64
5. I achieved each of the program objectives.	0	0	1	16	14	31	4.42
6. My personal objectives were met.	0	0	1	12	20	33	4.58
7. Location	0	0	1	5	26	32	4.78
8. Program length	0	0	1	12	17	30	4.53
9. Room temperature	0	2	2	14	12	30	4.20
10. Room seating	2	1	3	10	14	30	4.10
11. Room lighting	0	0	2	11	16	29	4.48
12. Registration fee	0	2	8	7	13	30	4.03
13. Breaks	0	3	4	11	11	29	4.03
14. Meals	0	0	2	10	14	26	4.46
15. Size of session	0	2	1	12	12	27	4.26
16. Registration process	0	1	1	10	16	28	4.46
17. Audiovisual support	0	0	1	10	18	29	4.59
18. Facility quality	0	0	0	12	17	29	4.59
19. Lodging	0	0	2	5	8	15	4.40
20. Room cost	0	1	1	7	4	13	4.08
DISCLOSURE OF COMMERCIAL SUPPORT					N/ A	YES	NO
21. Was there an announcement made at the beginning of the course regarding the commercial support provided for this activity?					11	0	9
22. Were you informed of any relationship between faculty and the corporate sponsors?					8	1	8
23. Did you feel the disclosure adequately allowed you to interpret any bias which may have been presented?					14	2	1
24. Was bias in favor of a product present to the extent that the presentation was unbalanced or represented commercial promotion?					13	0	4

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 1

FACULTY EVALUATION								
PRESENTER(s)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score	
	1	2	3	4	5			
Dr. Robert Joy	0	0	1	5	25	31	4.77	
OBJECTIVE EVALUATION								
1. Describe the historical account of the lives of Sailors, Marines, & Airmen from Roman times to today.	0	1	2	6	23	32	4.59	
OVERALL PRESENTATION EVALUATION								
To what extent did the content relate to the session objectives?	0	0	4	8	19	31	4.48	
To what extent were the teaching methods and aids appropriate and used effectively?	0	0	0	9	20	29	4.69	
To what extent were the physical facilities conducive to learning?	0	0	1	10	18	29	4.59	
To what extent were your personal objectives met?	0	1	4	10	16	31	4.32	

### ADDITIONAL COMMENTS:

- World class presentation!

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 2

FACULTY EVALUATION								
PRESENTER(S)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score	
	1	2	3	4	5			
BG Evelyn Foote	0	0	0	8	25	33	4.76	
OBJECTIVE EVALUATION								
1. Discuss significant problems and unique stressors experienced by women in the integration of women into the US Army.	0	1	2	7	25	35	4.60	
2. Discuss where military women are today in the process of integration and make recommendations.	0	2	2	8	16	28	4.36	
OVERALL PRESENTATION EVALUATION								
To what extent did the content relate to the session objectives?	0	0	3	11	17	31	4.45	
To what extent were the teaching methods and aids appropriate and used effectively?	0	0	5	9	18	32	4.41	
To what extent were the physical facilities conducive to learning?	0	0	4	10	20	34	4.47	
To what extent were your personal objectives met?	0	1	4	13	17	35	4.31	

### ADDITIONAL COMMENTS:

- Tremendously moving and inspirational speaker - Bravo!

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 3

FACULTY EVALUATION								
PRESENTER(s)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score	
	1	2	3	4	5			
LTC Ann Norwood	0	0	1	13	13	27	4.44	
OBJECTIVE EVALUATION								
1. Describe stressors affecting military women.	0	0	1	12	15	28	4.50	
2. Describe the methodological limitations affecting studies of military women's response to stressors.	0	0	2	14	7	23	4.22	
OVERALL PRESENTATION EVALUATION								
To what extent did the content relate to the session objectives?	0	0	0	11	15	26	4.58	
To what extent were the teaching methods and aids appropriate and used effectively?	0	0	2	14	10	26	4.31	
To what extent were the physical facilities conducive to learning?	0	0	3	10	11	24	4.33	
To what extent were your personal objectives met?	0	0	2	10	11	23	4.39	

### ADDITIONAL COMMENTS:

- NONE RECEIVED.



# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 4

FACULTY EVALUATION							
PRESENTER(s)	# of Participants Rating Presenter 1 = Low      5 = High					Number of Evaluations Completed	Mean Score
	1	2	3	4	5		
Dr. Jessica Wolfe	0	0	0	7	18	25	4.72
OBJECTIVE EVALUATION							
1. Identify gender-specific causes of trauma in women.	0	0	1	7	15	23	4.61
2. Discuss possible factors influencing outcomes following trauma exposure and the role of clinical interventions for female military personnel.	0	0	1	7	11	19	4.53
OVERALL PRESENTATION EVALUATION							
To what extent did the content relate to the session objectives?	0	0	0	6	16	22	4.73
To what extent were the teaching methods and aids appropriate and used effectively?	0	0	1	7	16	24	4.63
To what extent were the physical facilities conducive to learning?	0	0	3	7	13	23	4.43
To what extent were your personal objectives met?	0	0	1	7	14	22	4.59

### ADDITIONAL COMMENTS:

- Would like copies of her slides.
- Very informative.
- Outstanding speaker/researcher.

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 5

FACULTY EVALUATION								
PRESENTER(s)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score	
	1	2	3	4	5			
CAPT Rosemary Mariner	0	0	0	14	12	26	4.46	
OBJECTIVE EVALUATION								
1. Discuss military women and gender integration into the community of Naval aviators.	0	0	1	13	12	26	4.42	
OVERALL PRESENTATION EVALUATION								
To what extent did the content relate to the session objectives?	0	0	0	10	15	25	4.60	
To what extent were the teaching methods and aids appropriate and used effectively?	1	0	3	9	12	25	4.24	
To what extent were the physical facilities conducive to learning?	0	0	4	9	11	24	4.29	
To what extent were your personal objectives met?	1	0	2	10	11	24	4.25	

### ADDITIONAL COMMENTS:

- Presentation style was uneven. Don't think the forum allowed her to shine.
- Very interesting speaker.

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 6

FACULTY EVALUATION								
PRESENTER(s)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score	
	1	2	3	4	5			
MAJ Loree Sutton	0	0	1	5	17	23	4.70	
OBJECTIVE EVALUATION								
1. Give examples of stressors experienced in Operation Desert Storm.	0	0	1	5	18	24	4.71	
OVERALL PRESENTATION EVALUATION								
To what extent did the content relate to the session objectives?	0	0	0	6	15	21	4.71	
To what extent were the teaching methods and aids appropriate and used effectively?	1	0	5	5	10	21	4.10	
To what extent were the physical facilities conducive to learning?	0	0	2	8	10	20	4.40	
To what extent were your personal objectives met?	0	0	2	9	10	21	4.38	

### ADDITIONAL COMMENTS:

- Very dynamic and enthusiastic speaker !! A MUST for future sessions. Her experience during Desert Storm were most beneficial.
- Superb extemporaneous speaker! Very knowledgeable.
- Good speaker.
- Very good speaker - bring her back.
- Dramatic speaker!

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 7

FACULTY EVALUATION								
PRESENTER(s)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score	
	1	2	3	4	5			
LtCol Regina Aune	0	0	0	8	14	22	4.64	
OBJECTIVE EVALUATION								
1. Describe the nature of humanitarian operations.	0	1	2	9	10	22	4.27	
2. Identify at least two factors that make humanitarian operations emotionally draining and logistically difficult.	0	1	2	6	10	19	4.32	
OVERALL PRESENTATION EVALUATION								
To what extent did the content relate to the session objectives?	0	0	1	7	12	20	4.55	
To what extent were the teaching methods and aids appropriate and used effectively?	1	0	5	5	10	21	4.10	
To what extent were the physical facilities conducive to learning?	0	0	3	6	10	19	4.37	
To what extent were your personal objectives met?	0	0	2	7	11	20	4.45	

### ADDITIONAL COMMENTS:

- Interesting story!

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 8

FACULTY EVALUATION								
PRESENTER(s)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score	
	1	2	3	4	5			
PANEL DISCUSSION						0.00	??	
OBJECTIVE EVALUATION								
1. Discuss topics of environmental stressors and military women addressed in sessions 002 - 006.	0	0	2	6	9	17	4.41	
OVERALL PRESENTATION EVALUATION								
To what extent did the content relate to the session objectives?	0	0	2	5	8	15	4.40	
To what extent were the teaching methods and aids appropriate and used effectively?	0	0	4	3	7	14	4.21	
To what extent were the physical facilities conducive to learning?	0	0	2	5	9	16	4.44	
To what extent were your personal objectives met?	0	0	2	7	6	15	4.27	

### ADDITIONAL COMMENTS:

- Insufficient time.

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 9

FACULTY EVALUATION								
PRESENTER(s)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score	
	1	2	3	4	5			
Dr. Robert J. Ursano	0	0	0	2	12	14	4.86	
OBJECTIVE EVALUATION								
1. Explain the relationship between gender, stress, and health.	0	0	1	1	11	13	4.77	
2. Identify traumatic stress and health interactions.	0	0	2	1	5	8	4.38	
OVERALL PRESENTATION EVALUATION								
To what extent did the content relate to the session objectives?	0	0	0	2	9	11	4.82	
To what extent were the teaching methods and aids appropriate and used effectively?	0	0	3	1	7	11	4.36	
To what extent were the physical facilities conducive to learning?	0	0	2	3	6	11	4.36	
To what extent were your personal objectives met?	0	0	1	2	8	11	4.64	

### ADDITIONAL COMMENTS:

- Schedule ran too late - some of us are mothers and need to get home to relieve babysitters.
- Tied things together very well.
- Excellent summarization and commentary.



# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 10

FACULTY EVALUATION								
PRESENTER(S)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score	
	1	2	3	4	5			
LTC(P) Carla Hawley-Bowland	0	0	0	4	18	22	4.82	
OBJECTIVE EVALUATION								
1. Discuss three health concerns of the active duty woman who is deployed.	0	0	0	2	20	22	4.91	
2. Identify at least two changes in the sundry packs to accommodate women in the field.	0	0	0	2	14	16	4.88	
OVERALL PRESENTATION EVALUATION								
To what extent did the content relate to the session objectives?	0	0	0	2	19	21	4.90	
To what extent were the teaching methods and aids appropriate and used effectively?	0	0	1	2	18	21	4.81	
To what extent were the physical facilities conducive to learning?	0	0	2	5	12	19	4.53	
To what extent were your personal objectives met?	0	0	1	2	16	19	4.79	

### ADDITIONAL COMMENTS:

- Great info.
- Effective and practical presentation - great use of humor.

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 11

FACULTY EVALUATION								
PRESENTER(s)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score	
	1	2	3	4	5			
LTC Dan Gehlbach	0	0	0	7	18	25	4.72	
OBJECTIVE EVALUATION								
1. Describe limitations of the different types of birth control and the reasons they fail.	0	0	0	7	18	25	4.72	
2. Discuss methods to improve contraceptive efficacy among servicewomen, particularly during deployment.	0	0	0	9	11	20	4.55	
OVERALL PRESENTATION EVALUATION								
To what extent did the content relate to the session objectives?	0	0	0	4	18	22	4.82	
To what extent were the teaching methods and aids appropriate and used effectively?	0	0	2	7	14	23	4.52	
To what extent were the physical facilities conducive to learning?	0	0	2	8	13	23	4.48	
To what extent were your personal objectives met?	0	0	1	7	13	21	4.57	

### ADDITIONAL COMMENTS:

- Liked his "aggressive" proactive approach. Enough studies, let's do it !!
- Excellent presentation.

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 12

FACULTY EVALUATION								
PRESENTER(s)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score	
	1	2	3	4	5			
LCDR Nancy Petit	0	0	2	8	14	24	4.50	
OBJECTIVE EVALUATION								
1. Describe the scope of dysfunctional uterine bleeding in active duty women.	0	0	2	6	15	23	4.57	
2. Discuss management options available for treating dysfunctional uterine bleeding.	0	0	0	6	12	18	4.67	
OVERALL PRESENTATION EVALUATION								
To what extent did the content relate to the session objectives?	0	0	2	5	15	22	4.59	
To what extent were the teaching methods and aids appropriate and used effectively?	0	0	1	7	12	20	4.55	
To what extent were the physical facilities conducive to learning?	0	0	2	6	13	21	4.52	
To what extent were your personal objectives met?	0	1	1	9	9	20	4.30	

### ADDITIONAL COMMENTS:

- Difficult to follow at times - too technical even for healthcare providers. Definitely for line community.
- Missed target audience.
- Too scientific for audience at large.

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 13

FACULTY EVALUATION								
PRESENTER(S)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score	
	1	2	3	4	5			
Dr. Daniel V. Landers	0	0	0	5	19	24	4.79	
OBJECTIVE EVALUATION								
1. Discuss methodology in diagnosing lower genital tract infections in military women in remote settings.	0	0	0	6	18	24	4.75	
OVERALL PRESENTATION EVALUATION								
To what extent did the content relate to the session objectives?	0	0	0	7	16	23	4.70	
To what extent were the teaching methods and aids appropriate and used effectively?	0	0	2	4	17	23	4.65	
To what extent were the physical facilities conducive to learning?	0	0	2	8	10	20	4.40	
To what extent were your personal objectives met?	0	0	2	7	11	20	4.45	

### ADDITIONAL COMMENTS:

- Good info realtion to "hands on". Very knowledgeable.
- Terrific speaker - great use of humor to enhance impact.

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 14

FACULTY EVALUATION								
PRESENTER(S)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed		Mean Score
	1	2	3	4	5			
COL Cesar Rosa	0	1	0	6	21	28		4.68
OBJECTIVE EVALUATION								
1. Describe the implications of pregnancy during deployment.	0	0	1	7	20	28		4.68
2. Discuss legal issues and social aspects of pre-deployment screening.	0	0	1	6	15	22		4.64
3. Define the screening tools available.	0	0	1	7	13	21		4.57
OVERALL PRESENTATION EVALUATION								
To what extent did the content relate to the session objectives?	0	0	1	5	20	26		4.73
To what extent were the teaching methods and aids appropriate and used effectively?	0	0	2	5	18	25		4.64
To what extent were the physical facilities conducive to learning?	0	0	4	7	12	23		4.35
To what extent were your personal objectives met?	0	0	1	6	16	23		4.65

### ADDITIONAL COMMENTS:

- Raised interesting questions.
- Brought up interesting aspects to discuss.

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 15

FACULTY EVALUATION								
PRESENTER(S)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score	
	1	2	3	4	5			
CDR Gregory Moore	0	0	2	9	13	24	4.46	
OBJECTIVE EVALUATION								
1. Outline the physiologic changes of pregnancy and how these changes impact the workplace.	0	0	1	8	15	24	4.58	
2. List five occupational hazards for pregnant servicewomen.	0	0	0	8	11	19	4.58	
OVERALL PRESENTATION EVALUATION								
To what extent did the content relate to the session objectives?	0	0	2	5	15	22	4.59	
To what extent were the teaching methods and aids appropriate and used effectively?	0	0	4	6	12	22	4.36	
To what extent were the physical facilities conducive to learning?	0	0	3	6	12	21	4.43	
To what extent were your personal objectives met?	0	0	5	3	13	21	4.38	

### ADDITIONAL COMMENTS:

- Left audience with perception that our healthcare is substandard.
- Informative content - smug presentation style detracted from message.

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 16

FACULTY EVALUATION								
PRESENTER(s)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score	
	1	2	3	4	5			
Christine Wahl	0	0	5	12	7	24	4.08	
OBJECTIVE EVALUATION								
1. Describe the different family situations experienced by active duty women.	0	0	4	11	8	23	4.17	
2. List at least three DoD policies that affect the health of active duty wives and mothers and their children.	0	0	5	10	5	20	4.00	
OVERALL PRESENTATION EVALUATION								
To what extent did the content relate to the session objectives?	0	0	1	15	7	23	4.26	
To what extent were the teaching methods and aids appropriate and used effectively?	0	0	5	11	7	23	4.09	
To what extent were the physical facilities conducive to learning?	0	0	4	8	9	21	4.24	
To what extent were your personal objectives met?	0	2	5	9	7	23	3.91	

### ADDITIONAL COMMENTS:

- No new information - content obvious to this audience. Overly simplistic.



# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 17

FACULTY EVALUATION								
PRESENTER(s)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score	
	1	2	3	4	5			
MAJ Beth Davis	0	0	0	11	9	20	4.45	
OBJECTIVE EVALUATION								
1. Describe the effect of military policies on active duty women.	0	0	1	12	8	21	4.33	
OVERALL PRESENTATION EVALUATION								
To what extent did the content relate to the session objectives?	0	0	0	10	9	19	4.47	
To what extent were the teaching methods and aids appropriate and used effectively?	0	0	3	9	8	20	4.25	
To what extent were the physical facilities conducive to learning?	0	0	3	8	7	18	4.22	
To what extent were your personal objectives met?	0	0	4	6	7	17	4.18	

### ADDITIONAL COMMENTS:

- Limited perspective. Shallow content.

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 18

FACULTY EVALUATION								
PRESENTER(s)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score	
	1	2	3	4	5			
COL Doris Brown	0	0	0	9	11	20	4.55	
OBJECTIVE EVALUATION								
1. Describe the tenets of "Healthy People 2000" from the perspective of Health Affairs.	0	0	1	9	9	19	4.42	
2. Discuss the impact of "Healthy People 2000" on active duty servicewomen.	0	1	1	7	7	16	4.25	
OVERALL PRESENTATION EVALUATION								
To what extent did the content relate to the session objectives?	0	0	0	6	10	16	4.63	
To what extent were the teaching methods and aids appropriate and used effectively?	0	0	1	5	10	16	4.56	
To what extent were the physical facilities conducive to learning?	0	0	3	6	7	16	4.25	
To what extent were your personal objectives met?	0	1	3	5	7	16	4.13	

### ADDITIONAL COMMENTS:

- Numbers presented are not what I see in practice which are much lower.
- Very dynamic, enthusiastic speaker. Provided outstanding practical, reality-based approaches.
- Excellent overview.

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 19

FACULTY EVALUATION								
PRESENTER(s)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score	
	1	2	3	4	5			
Carolyn Becraft	0	0	1	2	16	19	4.79	
OBJECTIVE EVALUATION								
1. Describe the concepts of Constructive Advocacy.	0	1	1	3	16	21	4.62	
OVERALL PRESENTATION EVALUATION								
To what extent did the content relate to the session objectives?	0	0	1	4	12	17	4.65	
To what extent were the teaching methods and aids appropriate and used effectively?	0	0	2	5	10	17	4.47	
To what extent were the physical facilities conducive to learning?	0	0	3	7	6	16	4.19	
To what extent were your personal objectives met?	0	1	0	5	10	16	4.50	

### ADDITIONAL COMMENTS:

- Very dynamic, enthusiastic speaker. Experience on "the Hill" was excellent to share as an example of how to get things done. Need more speakers like her!!
- Excellent speaker and excellent presentation.
- Superb and inspiring presentation - extremely useful info.
- Great food for thought.
- Need handouts with steps for constructive advocacy.

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 20

FACULTY EVALUATION								
PRESENTER(S)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score	
	1	2	3	4	5			
QUESTION & ANSWER SESSION						0	??	
OBJECTIVE EVALUATION								
1. Discuss the topics of women and family issues addressed in Sessions 009 - 019.	0	0	2	5	7	14	4.36	
OVERALL PRESENTATION EVALUATION								
To what extent did the content relate to the session objectives?	0	0	2	5	5	12	4.25	
To what extent were the teaching methods and aids appropriate and used effectively?	0	0	4	3	4	11	4.00	
To what extent were the physical facilities conducive to learning?	0	0	2	3	6	11	4.36	
To what extent were your personal objectives met?	0	0	3	3	5	11	4.18	

### ADDITIONAL COMMENTS:

- Good wrap-up!

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 21

FACULTY EVALUATION							
PRESENTER(S)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score
	1	2	3	4	5		
Dr. Melinda Manore	0	0	1	3	18	22	4.77
OBJECTIVE EVALUATION							
1. Describe the factors that influence dieting behaviors in active duty women.	0	0	4	6	11	21	4.33
2. Discuss the health consequences of chronic dieting.	0	0	1	5	12	18	4.61
OVERALL PRESENTATION EVALUATION							
To what extent did the content relate to the session objectives?	0	0	0	5	13	18	4.72
To what extent were the teaching methods and aids appropriate and used effectively?	0	0	1	2	14	17	4.76
To what extent were the physical facilities conducive to learning?	0	0	2	5	10	17	4.47
To what extent were your personal objectives met?	0	0	1	4	13	18	4.67

### ADDITIONAL COMMENTS:

- Outstanding speaker and data.
- Best speaker! Really enjoyed it! Studies related to active women not active duty.
- Outstanding presentation - well targeted to audience!

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 22

FACULTY EVALUATION								
PRESENTER(s)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score	
	1	2	3	4	5			
LTC Nancy King	0	0	2	6	13	21	4.52	
OBJECTIVE EVALUATION								
1. Explain the significance of military nutritional surveys.	0	0	4	5	12	21	4.38	
2. Describe the nutritional issues relevant to military women.	0	0	3	2	12	17	4.53	
OVERALL PRESENTATION EVALUATION								
To what extent did the content relate to the session objectives?	0	0	3	3	14	20	4.55	
To what extent were the teaching methods and aids appropriate and used effectively?	0	0	3	3	13	19	4.53	
To what extent were the physical facilities conducive to learning?	0	0	3	4	13	20	4.50	
To what extent were your personal objectives met?	0	0	4	6	9	19	4.26	

### ADDITIONAL COMMENTS:

- Excellent data and info. We need to get word out to the troops.
- Wow! Two outstanding speakers in a row!!
- Need handouts.

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 23

FACULTY EVALUATION								
PRESENTER(s)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score	
	1	2	3	4	5			
Dr. Bernadette Marriott	0	0	4	9	11	24	4.29	
OBJECTIVE EVALUATION								
1. Describe the role of nutrition in the health of military women.	0	0	4	10	10	24	4.25	
OVERALL PRESENTATION EVALUATION								
To what extent did the content relate to the session objectives?	0	0	3	11	8	22	4.23	
To what extent were the teaching methods and aids appropriate and used effectively?	0	0	3	7	13	23	4.43	
To what extent were the physical facilities conducive to learning?	0	0	3	6	13	22	4.45	
To what extent were your personal objectives met?	0	0	7	6	8	21	4.05	

### ADDITIONAL COMMENTS:

- Poor outcomes demonstrated.
- Good info. Needs to speak up.
- Excellent presentation.
- Need handouts.



# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 24

FACULTY EVALUATION								
PRESENTER(s)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score	
	1	2	3	4	5			
CDR Joseph Moore	0	0	0	2	16	18	4.89	
OBJECTIVE EVALUATION								
1. Describe common musculoskeletal injuries suffered by active duty women in training.	0	0	0	2	17	19	4.89	
OVERALL PRESENTATION EVALUATION								
To what extent did the content relate to the session objectives?	0	0	0	2	16	18	4.89	
To what extent were the teaching methods and aids appropriate and used effectively?	0	0	1	2	14	17	4.76	
To what extent were the physical facilities conducive to learning?	0	0	2	4	10	16	4.50	
To what extent were your personal objectives met?	0	0	0	4	13	17	4.76	

### ADDITIONAL COMMENTS:

- Excellent - linked to outcomes. Incorporated utilization management techniques.
- Outstanding speaker - bring again!
- Outstanding!!
- Disturbing findings. Excellent presentation.

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 25

FACULTY EVALUATION							
PRESENTER(S)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score
	1	2	3	4	5		
QUESTION & ANSWER SESSION						0	??
OBJECTIVE EVALUATION							
1. Discuss the topics of diet, fitness, and performance addressed in Sessions 020 - 024.	0	0	1	4	5	10	4.40
OVERALL PRESENTATION EVALUATION							
To what extent did the content relate to the session objectives?	0	0	0	2	6	8	4.75
To what extent were the teaching methods and aids appropriate and used effectively?	0	0	0	2	5	7	4.71
To what extent were the physical facilities conducive to learning?	0	0	0	4	2	6	4.33
To what extent were your personal objectives met?	0	0	0	2	4	6	4.67

### ADDITIONAL COMMENTS:

- Discussion was too focused on exercise.

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 26

FACULTY EVALUATION								
PRESENTER(S)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score	
	1	2	3	4	5			
Dr. Merrily Poth	0	0	1	0	7	8	4.75	
OBJECTIVE EVALUATION								
1. Relate the discussions from each breakout session.	0	0	1	3	6	10	4.50	
2. Discuss avenues of research and pose challenges for the future.	0	0	1	1	4	6	4.50	
OVERALL PRESENTATION EVALUATION								
To what extent did the content relate to the session objectives?	0	0	0	1	8	9	4.89	
To what extent were the teaching methods and aids appropriate and used effectively?	1	0	0	1	6	8	4.38	
To what extent were the physical facilities conducive to learning?	0	0	0	5	4	9	4.44	
To what extent were your personal objectives met?	0	0	1	1	7	9	4.67	

### ADDITIONAL COMMENTS:

- Great job !
- It was more beneficial than expected.

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 27 PREGNANCY AND REPRODUCTIVE HAZARDS

# NO DATA RECEIVED

FACULTY EVALUATION							
PRESENTER(s)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score
	1	2	3	4	5		
						0	??
OBJECTIVE EVALUATION							
1. Discuss didactic sessions addressing Pregnancy and Reproductive Hazards and propose avenues of research.						0	??
OVERALL PRESENTATION EVALUATION							
To what extent did the content relate to the session objectives?						0	??
To what extent were the teaching methods and aids appropriate and used effectively?						0	??
To what extent were the physical facilities conducive to learning?						0	??
To what extent were your personal objectives met?						0	??

### ADDITIONAL COMMENTS:

*It appears that the participants for this breakout session were not informed as to the objectives; therefore, no evaluations were received.*

-ILT Tim Osbon

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 28 GYN ISSUES AND DEPLOYMENT

# NO DATA RECEIVED

FACULTY EVALUATION							
PRESENTER(s)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score
	1	2	3	4	5		
						0	??
OBJECTIVE EVALUATION							
1. Discuss didactic sessions addressing GYN Issues and Deployment and propose avenues of research.						0	??
OVERALL PRESENTATION EVALUATION							
To what extent did the content relate to the session objectives?						0	??
To what extent were the teaching methods and aids appropriate and used effectively?						0	??
To what extent were the physical facilities conducive to learning?						0	??
To what extent were your personal objectives met?						0	??

### ADDITIONAL COMMENTS:

*It appears that the participants for this breakout session were not informed as to the objectives; therefore, no evaluations were received.*

*-ILT Tim Osbon*

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 29 STRESS AND EXTREME ENVIRONMENTS

# NO DATA RECEIVED

FACULTY EVALUATION							
PRESENTER(S)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score
	1	2	3	4	5		
						0	??
OBJECTIVE EVALUATION							
1. Discuss didactic sessions addressing Stress and Extreme Environments and propose avenues of research.						0	??
OVERALL PRESENTATION EVALUATION							
To what extent did the content relate to the session objectives?						0	??
To what extent were the teaching methods and aids appropriate and used effectively?						0	??
To what extent were the physical facilities conducive to learning?						0	??
To what extent were your personal objectives met?						0	??

### ADDITIONAL COMMENTS:

*It appears that the participants for this breakout session were not informed as to the objectives; therefore, no evaluations were received.*

-1LT Tim Osbon

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 30 NUTRITIONAL ISSUES

# NO DATA RECEIVED

FACULTY EVALUATION							
PRESENTER(s)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score
	1	2	3	4	5		
						0	??
OBJECTIVE EVALUATION							
1. Discuss didactic sessions addressing Nutritional Issues and propose avenues of research.						0	??
OVERALL PRESENTATION EVALUATION							
To what extent did the content relate to the session objectives?						0	??
To what extent were the teaching methods and aids appropriate and used effectively?						0	??
To what extent were the physical facilities conducive to learning?						0	??
To what extent were your personal objectives met?						0	??

### ADDITIONAL COMMENTS:

*It appears that the participants for this breakout session were not informed as to the objectives; therefore, no evaluations were received.*

*-1LT Tim Osbon*



# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 31 CONSTRUCTIVE ADVOCACY FOR FAMILY AND PARENTING ISSUES

# NO DATA RECEIVED

FACULTY EVALUATION							
PRESENTER(S)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score
	1	2	3	4	5		
						0	??
OBJECTIVE EVALUATION							
1. Discuss didactic sessions addressing Constructive Advocacy for Family and Parenting Issues and propose avenues of research.						0	??
OVERALL PRESENTATION EVALUATION							
To what extent did the content relate to the session objectives?						0	??
To what extent were the teaching methods and aids appropriate and used effectively?						0	??
To what extent were the physical facilities conducive to learning?						0	??
To what extent were your personal objectives met?						0	??

### ADDITIONAL COMMENTS:

*It appears that the participants for this breakout session were not informed as to the objectives; therefore, no evaluations were received.*

-ILT Tim Osbon

# Forum on the Health of Women in the Military

June 17 - 19, 1996

## Session 32 EXERCISE, CONDITIONING, AND REHABILITATION

# NO DATA RECEIVED

FACULTY EVALUATION							
PRESENTER(s)	# of Participants Rating Presenter 1 = Low                      5 = High					Number of Evaluations Completed	Mean Score
	1	2	3	4	5		
						0	??
OBJECTIVE EVALUATION							
Discuss didactic sessions addressing Exercise, Conditioning, and Rehabilitation and propose avenues of research.						0	??
OVERALL PRESENTATION EVALUATION							
To what extent did the content relate to the session objectives?						0	??
To what extent were the teaching methods and aids appropriate and used effectively?						0	??
To what extent were the physical facilities conducive to learning?						0	??
To what extent were your personal objectives met?						0	??

### ADDITIONAL COMMENTS:

*It appears that the participants for this breakout session were not informed as to the objectives; therefore, no evaluations were received.*

-ILT Tim Osbon

## **SUMMARY OF EVALUATIONS**

I. 20 evaluation sheets were received. Of the 20 participants who responded, 17 or 85% were in favor of the Forum on the Health of Women in the Military becoming an annual event. The remaining 3 or 15% suggested that the conference should take place every 2-3 years.

II. There were many suggested topics for future meetings. The suggestions could be broken down into 3 groups: Military Issues, Family Issues, and Health Issues:

### **A. Military Issues:**

- (1) refugee support
- (2) remote assignments (stressors)
- (3) reserve issues
- (4) deployment issues
- (5) discussion of experiences by deployed women
- (6) women in leadership issues

### **B. Family Issues:**

- (1) family violence
- (2) child development center/day care issues
- (3) marital issues
- (4) coming home issues for military mothers

### **C. Health Issues:**

- (1) health care access
- (2) stress reduction programs
- (3) breast cancer
- (4) lactation issues
- (5) health promotion/wellness
- (6) how to stop dieting cycle
- (7) mental illness prevention,
- (8) pregnancy/postpartum exercise
- (9) nutrition and lifestyle education
- (10) obesity
- (11) health issues affecting performance,
- (12) discussion on MRDA (Military Recommended Daily Allowance)

Additionally, it was recommended that among the topics addressed should be the research findings from other projects funded by the Defense Women's Health

Initiative.

III. 13 participants, or 65%, gave suggestions for speakers and participants who should be involved in future conferences.

A. The specific list of recommended speakers along with their area of expertise is as follows:

- (1) Dr. Charlotte Gaydes - STDs
- (2) Dr. Julie Paulin - women in Korea
- (3) Barbara Pare - violence
- (4) Dr. Greg Moore - refugee women's issues
- (5) LCDR Diane Aldrich - summation of her GTMO Bay experience
- (6) Col. Doris Browne - DACOWITZ issues, breast cancer
- (7) Bruce Jones - injury
- (8) LTC Valerie Rice - ergonomic issues

B. More generalized recommendations for future speakers were made as well. They include:

- (1) A female sports medicine expert
- (2) USUHS female graduate who was captured in Desert Storm
- (3) A senior NCO from one or all branches of military

C. 4 respondents expressed that they would like to see more participation in the future from the Army and the Marines; some other suggestions for future participants included:

- (1) more enlisted representation
- (2) broader geographic and job distribution
- (3) Congressional members
- (4) policy makers
- (5) family support representatives
- (6) DACOWITZ representatives

IV. Some additional comments made by respondents:

- (1) Handouts or slide copies of each presentation should be distributed
- (2) increase mailing distributions and time frame
- (3) less technical presentations, i.e., speak to the audience
- (4) have volunteer pass microphone to audience participants
- (5) submit article/proceedings/outcome to chief nurse of each service and to appropriate VIPs
- (6) distribute attendance roster to all attendees for networking purposes

V. The following respondents were interested in helping organize future meetings:

COL Adeline Washington, USA  
Dir., Hlth Prom & Wellness  
Army Com. Hlth Nsg. Consultant  
USACHPPM  
Aberdeen Proving Ground, MD 21010-5422  
(410) 671-2303

Joan Eitzen  
4442 Cross Country Dr.  
Ellicott City, MD 21042  
(410) 750-6673

Elizabeth Reiser  
(360) 478-9579

Marjorie Slagle, USPHS  
Occupational Health Consultant  
Federal Occupational Health  
5736 So. 238th Ct, #E5  
Kent, WA 98032-3708  
(206) 615-2515

LCDR Diane J. Aldrich, NC, USN  
Family Nurse Practitioner  
Naval Hospital  
One Riggs Road  
Newport, RI 02840  
(401) 841-1279

Anita Singh, Ph.D.  
Asst. Prof, Mil. and Emergency Med.  
USUHS  
295-3020

CDR Dorothy Grace, NC, USN  
Division Officer Mother/Baby Unit  
NH Camp LeJeune, NC  
Home: 201 Biltmore Ln  
Jacksonville, NC 28546  
(910) 347-5805

Mallory Tytel, Ph.D.(c)  
Project Director  
Artist Corporation

9120 Tulip Grove Rd.  
Gaithersburg, MD 20879  
(703) 681-5583

Dr. Sydne Carlson  
Staff Officer  
Food and Nutrition Board  
2101 Constitution Ave NW  
Washington, DC 20418  
(202) 334- 2384

Patricia Deuster, Ph.D.  
Mil. and Emer. Med.  
USUHS  
295-3020

LTC Nancy King, MC, USA  
Nutrition Care Division (MCHE-DFC)  
Bldg 3600, 3851 Roger Brooke Dr.  
Fort Sam Houston, TX 78234-6306  
(210) 916-5525

VI. For mailing list next year, contact:

Chief, Naval Personnel  
PERS OOW  
Bureau of Naval Personnel - Navy Annex  
Washington, DC  
(703) 695-6396

## EVALUATION

1. Would you support the Forum on the Health of Women in the Military becoming an annual event?

Yes

No

2. What topics would you like to have addressed in future meetings?

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3. Do you have any suggestions for speakers and/or participants who should be included in future meetings?

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4. Would you be interested in helping organize future meetings?

Yes

No

5. Any additional comments or suggestions: \_\_\_\_\_

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# WOMEN'S HEALTH ISSUES

Official Publication of The Jacobs Institute of Women's Health

■  
**Military Women as Wives and Mothers**  
*Christine Kralovansky Wahl, Virginia F. Randall*

■  
**Exercise in the Prevention and Treatment of Chronic Disorders**  
*Patricia A. Deuster*

■  
**Chronic Dieting in Active Women: What Are the Health Consequences?**  
*Melinda M. Manore*

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**Vaginitis/Cervicitis: Diagnosis and Treatment Options  
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# WOMEN'S HEALTH ISSUES

Official Publication of The Jacobs Institute of Women's Health

Volume 6, Number 6

November/December 1996

## Contents

### *Conference*

*Forum on the Health of Women in the Military:*

Executive Summary 311

Merrily Poth



### *Article*

**Military Women as Wives and Mothers 315**

Christine Kralovansky Wahl, Virginia F. Randall



### *Article*

**Exercise in the Prevention and Treatment  
of Chronic Disorders 320**

Patricia A. Deuster



### *Article*

**Chronic Dieting in Active Women: What Are the  
Health Consequences? 332**

Melinda M. Manore



### *Article*

**Vaginitis/Cervicitis: Diagnosis and Treatment Options in a Limited  
Resource Environment 342**

Daniel V. Landers



### *Conference*

**Selected Talks From the *Forum on the Health of Women in  
the Military* 349**



(continued)



1049-3867(199611/12)6:6\*;1-U

## Contents (continued)

Conference Participants 381

Author Index 383

Subject Index 385

*Contents of Volume 6 Follow Subject Index*

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# WOMEN'S HEALTH ISSUES

## AIMS AND SCOPE

*Women's Health Issues* (WHI) is the official publication of The Jacobs Institute of Women's Health and the only journal devoted to women's health issues at the medical/social interface. It is a journal for health professionals, social scientists, policy makers, and others concerned with the complex and diverse facets of health care delivery to women. WHI publishes peer-reviewed articles as well as position papers and reports from conferences and workshops sponsored by The Jacobs Institute of Women's Health.

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Unsolicited manuscripts addressing topics relating to women's health issues, as outlined in the Mission Statement of The Jacobs Institute—printed in the front pages of the Journal—are welcome.

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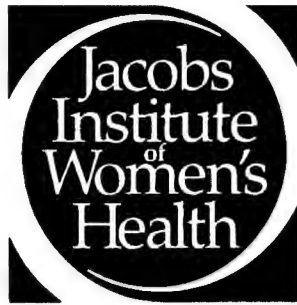
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The Jacobs Institute of Women's Health is an organization committed to excellence in women's health care. It will:

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- Facilitate informed dialogue and foster awareness among consumers and providers alike; and
- Promote problem resolution, interdisciplinary coordination and information dissemination at the regional, national, and international levels.

# Forum on the Health of Women in the Military: Executive Summary

**Merrily Poth, MD**

Course Director

Professor of Pediatrics

Uniformed Services University of the Health Sciences

Bethesda, Maryland

**I**ncreasing numbers of women are serving as active duty and reserve members of the U.S. Armed Forces. As their numbers increase, issues related to the performance, fitness, and health of these women become increasingly important to military readiness. Congress directed a funding initiative, the Defense Women's Health Research Program, to address the health of military women, especially as their health relates to mission readiness, deployment, and training. The Department of Defense organization with responsibility for the program, the Army Medical Research and Materiel Command, commissioned the Institute of Medicine (IOM) to collect published data and information on ongoing research on topics of relevance to the health of women in the military. This project led to the publication of a comprehensive bibliography of published articles, indexed by subject, along with a disk format of these publications.

We at the Uniformed Services University of the Health Sciences (USUHS) received a grant from the Defense Women's Health Research Program to fund a conference to discuss some of the information in the IOM report and to propagate these data to the larger community. Prior to the actual conference, which was held at USUHS on 17-19 June 1996, articles were commissioned on the topics to be discussed. These articles were distributed to the meeting participants prior to the meeting and served as background for the presentations and discussions occurring at the meeting.

This issue of *Women's Health Issues* includes a summary of the presentations and discussion and four of the background papers. Additional articles are under consideration for publication as a supplement to the journal *Military Medicine*. We have chosen to divide the proceedings in this way to allow publication of all the commissioned articles and to provide maximal distribution of the conference proceedings and commissioned articles, as well as the presentations and discussion.

The real integration of women into the active duty and reserve forces received substantial impetus from the abolishment of the draft in 1974. Confronted with the need to incorporate women effectively in order to maintain numbers and the quality needed for the military, previous limits on numbers of female members and on numbers of officers were raised. This began, however, in 1967, when President Lyndon Johnson signed into law Public Law

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90-130, which rescinded the limitation on grades for women in all branches of the military. He also rescinded the previous 2% limit to which women could participate in the armed forces. Theoretically, from that day forward a woman could attain any rank including that of flag. In 1978 the Women's Army Corps was disestablished. The real integration of women into all branches of the armed forces continues today. However, this process has not always been smooth and certainly not without its detractors, but progress has been made and continues to be made.

## **STRESS AND EXTREME ENVIRONMENTS**

A description of the life of the soldier, sailor, or airman over the years might make one wonder why anyone, man or woman, would want to be a part of the military. However, the vivid and moving vignettes shared by some of the uniformed members of the panel, Evelyn Foote, Brigadier General (retired), US Army, Loree Sutton, Lt Colonel, US Army Medical Corps, Rosemary Mariner, Captain, US Navy, and Regina Aune, Lt Colonel, US Air Force, Nurse Corps, reveal that many women have served, not only with honor and distinction, but with satisfaction, accomplishment, pride, and even joy.

In Desert Storm, many women were deployed with their units and served in roles that women had not held previously. The stresses to which they were exposed included those shared by all military members: fear of the future and of the potential for loss of life or injury and uncertainty about what was to happen and when. In addition, for women there were, in some cases, incidents of assault and harassment. The loss of privacy and isolation were increased, in some cases, by the experience of feeling foreign to the culture both in the military and in the country that was being defended. For many others this experience of serving in a combat unit validated once and for all their worth and role in the military.

Overall, women served productively and the public exposure in the media of the concept of women "defending our country" was presented to the American public in an unprecedented way. When the war was over, not only had active-duty women suffered the same stresses and helped to accomplish the same victory as the men, but the entire country had seen it happen. This experience cannot be rescinded, and partly as a result of this conflict and women's role in it, the exclusions on women in many combat roles are being examined and even overturned.

The issue of whether being a woman results in increased morbidity after exposure to deployment and combat has not proved to be a question for significant further debate. However, those examining the consequences of this wartime experience have found that the same problems and issues of women assuming traditionally male roles in general society occur in the military. It may be true that upon entering the military more women than men have already experienced trauma sufficient to increase their vulnerability to post-traumatic stress disorder. The effects of exposure to further trauma should be addressed expeditiously, in order to obviate long-term problems for women as well as men who experience trauma in the line of duty.

To date, no negative effects on military effectiveness have emerged as a consequence of the presence of women in the military. Although terrible things happened to some women during Desert Storm, no issues materialized to turn the tide and stop the flow toward full membership of women in the armed services.

## **GYNECOLOGY AND PREGNANCY ISSUES AND DEPLOYMENT**

Even as recently as Desert Storm, the logistics of supply and of medicine to support the presence and role of women in deployment probably were not

adequately addressed. Clothing and equipment issues designed for males made awkward fits for females. Certain medications and sanitary supplies were not part of the routine military support systems. Lessons were learned and changes were incorporated as a result of the experiences of the past decade. Field maneuvers are already better and supplies more appropriate for women. Research on equipment to improve its functionality when used by women continues. To alleviate the problems of trying to deal with medical problems in the field that clearly should be dealt with elsewhere, recommendations have been made for predeployment medical screening for both genders. The fact that gynecologic health issues arise during deployment should not be a surprise. Nor should gynecologic issues be more of a concern than are routine health issues in men.

Real and debated questions remain regarding the most effective policies for pregnancy and deployment. However, these questions should be addressed clearly. There are other disagreements regarding where women should be employed and deployed and at times the emotional issues of pregnancy are used as surrogate topics for discussion. Enlightened and informed discussion is needed to separate the real problems of health and safety and of force strength and effectiveness from misgivings based upon emotion or tradition.

When questions regarding women and society are addressed dispassionately, the consequent decisions often lead to more effective policy for men and for women. Pregnancy might be an excellent example of such a question. If women should not be deployed when pregnant, this should be decided specifically, the analogous restrictions on deployment should be in place for other physical and social conditions that might affect the military effectiveness of either gender.

## **PARENTING AND FAMILIES**

Parenting is very much an issue in the day of the all-volunteer force. There are amazing numbers of success stories regarding the existence of resources and support for the family, ranging from assistance for the young single parent to support for the family with special needs. Because women traditionally have been the primary caretakers of children and ill family members, there have been and may continue to be strains on the family as women strive to achieve success in the military. In the civilian sector, increasing numbers of women in the workforce have led to changes in workplace policy. These changes have often been for the ultimate good of men, women, and children. In the military, the tension between the good of the force and the good of the family at times remains real for many individuals, men and women. These problems may be more pronounced for the young, the junior, and the minority military members. These issues will need to continue to be addressed.

## **NUTRITION, EXERCISE, AND INJURY FOR ACTIVE DUTY WOMEN**

The woman on active duty shares the same problems and concerns of her civilian counterpart regarding nutrition, exercise, and weight maintenance. However, the woman on active duty is given the added official admonition that her weight and fitness periodically are assessed, and maintenance is a requirement for continued service. All of the inappropriate and ineffective lessons from the media regarding methods for maintenance of ideal body image are absorbed by military members, and attention should be paid to the results of these practices on the health and effectiveness of these women. The

food furnished in military dining facilities and in field rations was designed for the nutritional needs of men, and it has been found that women eating these foods cannot get enough of many nutrients (iron and calcium are two major nutrients on this list) without ingesting too many calories.

Likewise, the physical training in many of the basic training programs in the military results in unacceptably high rates of injury and attrition. It seems likely, if not certain, that equal levels of fitness can be attained with less injury and loss of potential personnel in both males and females. Efforts are underway to improve training as well as to enhance our ability to rehabilitate individuals after injury.

## **SUMMARY AND APPRECIATION**

The meeting was the product of the hard work and efforts of a large group of committed individuals. First, a committee of faculty members from USUHS, representing the entire range of interests in women's health, chose topics, authors to write the commissioned articles, and speakers for the meeting. Second, the authors of commissioned articles and the individual speakers for the meeting prepared and delivered outstanding information that was useful and at times provocative. Last but not least, the organizers thank Rebekah McLeod for her hard work, intelligence, and resourcefulness. Without her the conference would not have been possible. A measure of the success of this meeting might be seen in the fact that essentially all of the participants agreed not only that it was worthwhile but that a conference to address these issues should be repeated annually or biennially.

## **ORGANIZING COMMITTEE**

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# Military Women as Wives and Mothers

**Christine Kralovansky Wahl**

Department of Sociology  
University of Maryland, College Park  
College Park, Maryland

**COL Virginia F. Randall, MC, U.S. Army**

Clinical Associate Professor of Pediatrics  
Uniformed Services University of the Health Sciences  
Bethesda, Maryland

**N**early 52% of women in the military are married. The military unit and the family vie for the time, resources, and loyalty of military women in the two roles they play: military service member and wife/mother. Issues of special concern to women who are balancing these roles and commitments are child care, co-location for dual military spouses, elder care, policies around pregnancy and breastfeeding, and availability of family support programs.

Mady Segal<sup>1</sup> described the military and the family as "greedy institutions" in that they place a high number of demands on their members and require a great deal of sacrifice from them. These two institutions compete for the time, resources, and loyalty of their members, with their goals, demands, and requirements often in conflict with each other. Members of both institutions must somehow organize their lives so as not to allow discord between the institutions and instead find a "fit" between the two.

Women, even women with careers, are the primary caregivers to the children and the primary caretaker of the home. This is especially problematic for military women on active duty because their work responsibilities tend to be greater and the demands placed on them more extreme than their civilian counterparts. For some women, a demanding career in the military and a satisfying family life as a wife and mother are difficult to integrate successfully.

## DEMOGRAPHICS

The changing demographics of the military family reflect trends in much the same way that the population at large is experiencing them. When the military was (almost) exclusively male and unmarried, the demographic makeup of the military family was simple: it was either nonexistent, not recognized, or the "traditional" nuclear family of a working father, stay-at-home mother, and children. Much has changed since enlisted personnel were allowed to marry, women were permitted to serve, and women who were married and had children were not automatically discharged.<sup>2</sup>

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The following statistics are taken from the 1992 Department of Defense Surveys of Officers and Enlisted Personnel and Their Spouses (Department of Defense 1994)<sup>3</sup>: Most military members are now married (62.6%) with 63.6% male compared to 51.7% female. The highest percentage of married personnel is found in the upper enlisted and officer grades (E7-E9 and O4+). The Air Force has the highest percentage of married members (67.8) and the Marines the lowest (52.6).

Military women are more likely than men to have been married more than once (24.7% to 17.3%) and are much more likely to be married to another military person (53.8%) than are military men (7.3%). In general, 7.6% of all military personnel are in joint-military marriages/families, 85.5% of which are marriages between active duty members; 56.8% of joint-service couples have children, and of these families, 88.3% have children under the age of 13 living with them.

A military member married to a civilian is the most common family type (53.5%), and 79.1% of these families have children. Five percent of military personnel are single parents, and single parents in the military are more often women (63.9%) than men (36.1%).

Overall, 6.5% of military personnel report having elderly dependents (aged 65 and above), and 8.2% report having responsibility for elderly relatives.

### **SINGLE PARENTS**

Single parents have unique needs with regard to the strain between work and family. Wright examined the literature on the relationship between work and family for single parents in the military.<sup>4</sup> Single parents who are in the military face many of the same stressors as civilian single parents, including role strain, child care issues, and lack of discretionary time. However, the military does pose some unique stressors for its single parent members, while at the same time alleviating some of the problems civilian single parents face.

Civilian single parents often experience a reduction in their income after marital disruption (divorce, separation, death of spouse). In the military, income-related problems may be less severe than in the civilian workforce because of the military's equitable pay and benefit structure and job security. Still, financial strain may be present, especially among the lower enlisted ranks, because of the cost of child care expenses, especially child care requiring over 40 hours per week.

Child care is the most problematic issue for single parents who need care that is flexible, convenient, and available at reasonable cost. Deployments, work-related travel, and relocations pose additional and unique problems for child care arrangements. Family support programs, provided by each service, may be of assistance to single parents but participation by single parents is low.<sup>5</sup>

### **DUAL-CAREER COUPLES**

In dual-career couples, both spouses are involved in maintaining their own careers. For some, one spouse is active duty and the other employed in the civilian workforce; for others, both spouses are active duty ("dual-service couples"), although not necessarily in the same branch of service. The biggest issues for dual-career couples are role overload, child care arrangements, living arrangements (whether or not their jobs are co-located), and relocations.<sup>6</sup> Role overload for women occurs because they have traditionally been assigned



responsibility for the day-to-day running of the household, and, when they are pursuing a career, they often perform household tasks as "second shift."<sup>7</sup>

Military women in dual-career couples are most likely to give up their careers. "A disproportionate number of dual military members do not re-enlist because of family separations and the stress it places on the family. Usually it is the woman who chooses to leave the service and take more responsibility for the family, . . . [and] in many cases, the military services lose the best service-member in the wife's decision not to re-enlist."<sup>6</sup>

### **POLICIES AND PROCEDURES PARTICULAR TO ACTIVE DUTY WIVES AND MOTHERS\***

The policies of the armed services that most affect active duty women are those surrounding pregnancy and childbirth. The amount of leave after childbirth varies by service; leave granted after an uncomplicated delivery is 4 weeks in the Army, 42 days in the Navy and Marines, and 45 days in the Air Force. No special leave is granted after an adoption, although each service allows for the use of regular (vacation) leave for this purpose. No leave other than regular leave is granted to fathers after the birth of their children.

No branch of service has a standard policy on the length of hospital stays after vaginal or cesarean deliveries, although the average is up to 2 days for a vaginal delivery and 3 to 5 days after a C-section.

For the special needs baby, there is no one policy regulating the leave granted to or consideration for the parents. Regular leave may be used to remain with a special needs baby after the convalescence leave has ended, and in some cases a special case of temporary duty (TDY) is assigned to allow the service member to remain with the child. In general, consideration is given to the parents of a special needs infant in terms of duty assignment, work schedule, and rotation.

During Operation Desert Storm, much attention in the media was paid to the deployment of breastfeeding mothers and mothers of young infants/children. Although some have argued for a change in the policies of the armed forces for the nondeployment of women with young infants (especially those women who are still breastfeeding), no such policy has been developed.

The Coast Guard (Department of Transportation) has a Separation for the Care of a Newborn Policy that has been in effect since 1993. This policy allows up to *two years'* leave for *either a mother or father* after the birth or adoption of a child. Coast Guard members are guaranteed re-admission at the rank and pay grade they held when they took leave. This leave of up to two years is designed not to hinder or be detrimental to one's career progression, and although the program is very young, Coast Guard personnel report high levels of satisfaction with the program.

Other policies that affect active duty wives and mothers are those that allow service members to be both a parent and a soldier. These include flextime and flexible leave options.

### **HEALTHY PEOPLE 2000 AND OTHER HEALTH GOALS**

In 1990, the U.S. Department of Health and Human Services (DHHS) released its *Healthy People 2000: National Health Promotion and Disease Prevention Objectives*. DHHS (1993) has published a series of annual profiles tracking the nation's health goals for the year 2000.<sup>8</sup> Where comparable data are available, military women fare better than do their civilian counterparts. The military leadership has been especially proactive in preventing child and spouse

\* Information on the policies presented here was obtained through telephone interviews with personnel representatives for each service stationed at the Pentagon (or in Washington, DC, in the case of the Coast Guard).

abuse and neglect, and military rates for abuse and neglect are at or below civilian rates.<sup>9,10</sup> Two programs of note are the U.S. Navy Family Advocacy Program, which developed a model of risk assessment used to identify families in need, and the Department of Defense New Parent Support Program, which offers a variety of assistance to new and "at risk" families including counseling and home visits.

In 1994, the Department of Defense established a Defense Women's Health Research Project which directs funding to research according to the recommendations proposed by the National Academy of Science's Institute of Medicine. Two current research projects focus on access to and delivery of health care to women and the impact of sexual harassment and gender bias on active duty women's psychological and physical health. The Air Force Reproductive Hazards Initiative Group at Brooks Air Force Base, TX is publishing a technical report on the guidelines for handling reproductive concerns in the workplace, specifically workplaces with conditions which may be hazardous to pregnant women and their fetuses.

## POLICY ISSUES AND CONCERNS

Active duty wives and mothers are affected by military policies both directly and indirectly, and while the military has made an effort to address many of the concerns of these women, current issues still need to be confronted.

The leave granted women after pregnancy is relatively short by American corporate standards (usually at least 8 weeks, often 12 to 16) and extremely short by most European standards (many countries allow up to a year of paid leave). Since the military branches have no policies of nondeployment of breastfeeding mothers, mothers who may want to breastfeed their children may be forced to wean their children early and quickly if called away to duty. In addition, although breastfeeding is encouraged at military hospitals and by military health care professionals, once back in the field or with one's unit, continued breastfeeding of children may be exceedingly difficult if not impossible.

Fostering healthy mothers and babies is a goal of the armed forces. However, healthy motherhood means more than just a healthy pregnancy (something the military is successful at achieving for most of its population). The service branches are working toward making the military a more congenial place for military women to be mothers, and programs such as the New Parent Support Program are steps in reaching that goal. Carolyn Becraft's "fatherhood initiative" is another way in which the Department of Defense is focusing on the family as the unit of analysis instead of just directing its attention to the service member and treating family members as financial "dependents."

Other concerns of the military community involve the children of military women. Since women are usually the primary caretakers of children, policies and programs that affect the children of military personnel also affect military wives and mothers. Obtaining services overseas that are similar to the Women, Infants, and Children (WIC) Nutrition Program stateside remains a current issue. WIC provides nutrition monitoring and counseling and appropriate foodstuffs to families meeting income requirements. The use of WIC is associated with lower rates of prematurity and lower incidence of iron-deficient anemia among mothers and children.

The universal and comprehensive health care offered by the military does benefit military women and children. However, for various reasons, the number of well-child visits at the recommended intervals for military children may not be achieved. However, the health services do exist for those in need. For mothers of children with special health care needs, the military leaves much up

to the discretion of the supervisors at the unit level. Active duty mothers are frequently granted greater flexibility in their work responsibilities and schedules so that they are able to direct their attention to their children.

The military is recognizing that it must face the needs and wants of its *families* if it is to continue to attract America's "best and brightest" and keep its valued force. By working on issues related to families such as co-location for dual-service and dual-career couples, child care arrangements, and family support services, the military is actively promoting a positive environment for the active duty wife and mother.

## SUMMARY

The increasing number of women in the military, especially married women and mothers, is forcing the military to accommodate populations it did not have to deal with in the past. The military community has responded by initiating programs that address the needs of active duty wives and mothers, especially with regard to family support, health care, and available child care facilities. However, many policy questions pertaining to military women remain, including nondeployment of breastfeeding women or mothers of small infants, treating the family as the unit of analysis and not just the service member, and providing programs such as WIC and Head Start to its members overseas.

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# Exercise in the Prevention and Treatment of Chronic Disorders

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One of our nation's objectives for improving the health of the population by the year 2000 is to increase the overall level of physical activity. The Healthy People 2000 goals are based on a wealth of data indicating that regular physical activity confers a myriad of health benefits. At least 12 of the goals relate specifically to physical activity, including to increase the number of men, women, and children who exercise regularly and to decrease the proportion of persons who lead sedentary lifestyles.

To be certain the public understands what constitutes regular physical activity, the Centers for Disease Control and Prevention and the American College of Sports Medicine recently provided new guidelines for exercise. These new recommendations state that "every U.S. adult accumulate 30 minutes or more of moderate-intensity physical activity on most, preferably all, days of the week." Moderate intensity physical activity is defined as "activity performed at an intensity of 3 to 6 METs,\* or the equivalent of brisk walking at 3 to 4 mph for most healthy adults."<sup>1</sup> These new recommendations emphasize that extended periods of exercise or strenuous exercise are not required for health benefits and that short bouts of moderate exercise are important for health.

A beneficial role of exercise in women's health is well accepted. Some of the health benefits of exercise include weight loss, improved control of blood glucose and insulin in diabetes,<sup>2</sup> prevention of osteoporosis,<sup>3-5</sup> and reduced risk of cardiovascular disease and cancer.<sup>6,7</sup> Unfortunately, many people do not appreciate the extent of the benefits, in terms of other specific health problems. More recent studies indicate that exercise also may confer multiple benefits in patients with other chronic health problems, including rheumatologic diseases, depression and anxiety disorders, and osteoporosis.

Despite the clear benefits of exercise, only a small proportion of women engage in regular exercise. Data from the 1992 Behavioral Risk Factor Surveillance System (BRFSS), a population-based, random-digit-dialed telephone survey of the noninstitutionalized U.S. population, indicate that only 27.1% of adult women report participation at the newly recommended activity levels.<sup>8</sup> Moreover, the prevalence of inactivity increases with age: 42.1% of women 65 years and older are inactive. As much as a 50% decrease in physical activity may occur in women between the ages of 18 and 37.<sup>9</sup> The prevalence of par-

\*MET = work metabolic rate/resting metabolic rate.

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ticipation in physical activities is related to the socioeconomic variables: income and educational level. College graduates are more likely to report participating in regular activity (33.5%) as compared with women with only a high school (23.8%) and women with less than a high school (17.4%) education. Recent data also indicate that inactivity is greatest among overweight women: the prevalence of inactivity based on 1994 BRFSS data was 41% for overweight women of all ages.<sup>10</sup> The proportion of overweight women reporting no activity increased with age and decreased with education level. Finally, data from the Youth Risk Behavior Survey, a nationwide sample of students in all public, parochial, and other private schools, in grades 9 through 12, suggest that only 41.2% of high school girls exercised for at least 20 minutes the preceding day<sup>11</sup>; the percent declined from grade 9 to 12 (49.3% to 32.4%). Overall, the data indicate that the women of our nation are sedentary, starting from their high school days.

Given that regular exercise may reduce the risk for and/or be effective in the treatment of various chronic health problems for which the prevalence among women is high, it seems justified that regular physical activity should be promoted more widely among women. This article will seek to provide recent information with respect to the use of exercise in the prevention and/or treatment of selected disorders/diseases that primarily affect women, including breast cancer, several musculoskeletal disorders, and affective disorders.

## BREAST CANCER

The incidence of breast cancer in women between the ages of 40 and 49 was approximately 175 per 100,000<sup>12-14</sup> in 1989. Of those 175 women, at least 30 would have died within the year from the disease.<sup>12-14</sup> Unfortunately, the risk factors currently associated with breast cancer account for only 55% of the disease,<sup>5</sup> and these factors cannot be easily modified. For example, family history, menstrual and reproductive histories, and socioeconomic status are known risk factors over which women have minimal, if any, control. One potential protective factor over which women can exert control is physical activity. In the past 10 years numerous studies have been conducted and several theories have been proposed on how physical exercise might reduce the risk of certain cancers.<sup>15</sup> The first study results with regard to breast cancer and diseases of the breast were reported in 1985 and 1986. Frisch<sup>16</sup> surveyed approximately 5,398 women college alumnae between the ages of 21 and 80, half of whom were former athletes and the others nonathletes. After adjusting for family history, age, menstrual and reproductive history, and body fat, they found that the relative risk of breast cancer for nonathletes to athletes was 1.86. Moreover, the prevalence of benign diseases of the breast was also significantly lower in athletes.<sup>17</sup> This was the first evidence for a protective effect of exercise on breast cancer.

Not all subsequent reports have been as supportive. In a cohort design with data from the NHANES I study, Albanes<sup>18</sup> found different results after controlling for similar factors: they showed that exercise was protective against breast cancer only in women who were postmenopausal. In addition, their data suggested a possible increased risk of breast cancer among the most active premenopausal women. Paffenbarger<sup>19</sup> also failed to find any association between participation in sports during college and subsequent development of breast cancer. Dorgan<sup>20</sup> attempted to relate physical activity to risk of breast cancer based on data from the Framingham Heart Study cohort. After adjusting for known risk factors, as well as education, occupation, alcohol intake, and age, they concluded that exercise is not protective and that moderate to heavy leisure time physical activity may actually be associated with an increased risk.

Whereas some of these results could be used to support the notion that

moderate to heavy exercise may increase the risk of developing breast cancer, a case-control study by Bernstein<sup>21</sup> provides virtually opposite results. Lifetime histories of physical activity were obtained by interviewing 774 incident cases of breast cancer in women 30 to 40 years of age and 774 controls matched for age, parity, race, and neighborhood. After adjusting for potential confounding variables they found that the number of hours per week spent exercising was a significant predictor of breast cancer risk: the odds ratio for breast cancer among women who exercised more than 3.4 hours per week was only 0.28. They concluded that implementation of a regular exercise program and a healthy lifestyle should be a high priority for young and adult women.

There are several explanations for the conflicting results. One issue related to timing of the exercise. In several of the studies women were classified as "active" if they had participated in a university or college athletic program, and no regard was given to current or recent physical activity.<sup>16</sup> In addition, differentiation between leisure time activity and occupational activity was not usually made. Moreover, among all studies, only one assessment of physical activity was conducted.<sup>16,18,21,22</sup> As such, no association between the occurrence of the cancer and timing of the exercise program could be considered. Finally, and most importantly, the methodologies for quantifying physical exercise habits were different. For example, in the NHANES I study, subjects were asked only two questions regarding their exercise patterns ("In your usual day, aside from recreation, how active are you?" and "Do you get much exercise in things you do for recreation?"), and there were only three possible responses to these two questions:<sup>18</sup> "very active, moderately active, or quite inactive." These limited data were then used to conclude that exercise showed little relation to cancer. A physician-administered questionnaire was used in 1954 for the Framingham Heart Study<sup>22</sup> to assess physical activity. Subjects rated the hours they spent sleeping, working, and during leisure time as: sleep, sedentary, slight, moderate, or heavy activity. The hours reported were then multiplied by a specific energy expenditure value and summed to create an activity quotient. Approximately 26 years later this quotient was related to the occurrence of breast cancer with activity level. They concluded that exercise does not provide protection from breast cancer. In contrast, Bernstein<sup>21</sup> interviewed subjects and obtained periodic lifetime histories of physical activities and then classified subjects according to the number of lifetime hours per week spent exercising. Thus, the Bernstein study had a far more comprehensive and quantitative measure of physical activity patterns than the other studies, and presented convincing evidence of a reduced breast cancer risk in physically active women.

Although additional studies will be required to confirm a protective effect of exercise, more recent data suggest an inverse association between physical activity levels and risk of breast cancer, despite confounding factors, such as body fat, body mass, and dietary patterns.

## MUSCULOSKELETAL DISORDERS

Musculoskeletal disorders, including low back and neck pain, rheumatologic diseases, and osteoporosis, limit the activity of people of all ages, and have been estimated to affect 10% of the population.<sup>23</sup> Interestingly, exercise seems to confer some benefit in many of these disorders. Three disorders that affect a large number of women will be discussed.

### Fibromyalgia

Fibromyalgia (FM) is a painful condition primarily involving the musculoskeletal system.<sup>24-27</sup> Other dominant features of FM include: compromised sleep

patterns, fatigue, stiffness, subjective swelling, anxiety, and reactive depression. The cause(s) and pathophysiology of this commonly diagnosed disorder are poorly understood. When surveyed over the last decade, 5%–7% of patients entering general practice clinics/centers report FM symptoms.<sup>24</sup> Of those with FM, gender appears to be important; approximately 80%–95% of all cases are women, typically between the ages of 30 and 60 years.<sup>24,25,27</sup> More recent surveys show an increasing frequency and severity of FM. For example, a survey conducted on a population of young and middle-aged women in Norway found FM in 10.5% of the population.<sup>26</sup> Wolfe<sup>25</sup> found that FM is also quite common in older persons and the prevalence actually increases with age; a greater than 7% prevalence was found in women between 60 and 79.<sup>26–28</sup>

Although a number of studies have provided evidence that FM may reflect a disturbance in neurotransmitter regulation,<sup>29</sup> it has also been suggested that FM is a syndrome of physical deconditioning. Moldofsky<sup>30</sup> found that induction of a distinct interruption of stage-4 sleep, characterized by alpha-wave intrusion into the normal delta rhythm, in normal volunteers produced symptoms similar to those of patients with FM. Surprisingly, disruption of stage-4 sleep in three highly conditioned men, who were included as subjects, did not provoke FM-like symptoms. This finding has led investigators to hypothesize that FM may not occur in persons who are physically conditioned. Although many potential aberrations in muscle metabolism and function have been sought, no discernible defects in muscle have been uncovered.<sup>27,32</sup> However, the physical fitness levels of FM patients, including both aerobic capacity, flexibility, and muscle strength, are extremely low.<sup>32–36</sup>

Interestingly, exercise in the form of moderate aerobic activity may be therapeutic. Mengshoel<sup>36</sup> examined the effects of a 60-minute low-impact aerobic dance program twice a week for 20 weeks in women with FM. After the 20 weeks, all women in the exercise program felt that physical activity had increased their well being, and most noted marked reductions in muscular tension. Nichols<sup>37</sup> evaluated 17 women and 2 men with FM before and after an eight week program of walking 20 minutes a day, three days per week. After the eight weeks, those in the exercise group had lower ratings for pain and total symptoms as compared to before the exercise. Thus, cardiovascular or aerobic conditioning appears to confer significant benefit with improvements in pain threshold, aerobic fitness, and global health assessment scores by both the patient and physician in patients with FM.<sup>34,36</sup> Further support for a beneficial effect of exercise is provided by the finding that in a survey of 52 patients with FM, 38.9% reported using some form of aerobic exercise as their primary mode of treatment (unpublished data). Other self-reported treatments included massage therapy (33%) and physical therapy (14%). Thus, it appears that both active and passive muscle activity may confer benefit for some FM patients.

In summary, exercise may assist in reducing the symptomatology and functional disability associated with FM, as well as improve fitness levels. Given that no other effective treatments are currently available, this approach could be important. However, proper prescription and instruction as to the intensity, frequency, and duration of the exercise are necessary. Further investigation will be required to determine the mechanism by which exercise modifies the pain and other symptoms associated with FM.

## RHEUMATOID ARTHRITIS

Rheumatoid arthritis (RA) is a chronic, systemic, autoimmune inflammatory disease believed to affect approximately 1% of the population;<sup>23</sup> most of those affected are women. Many years ago patients with active RA were advised to rest and perform no physical activity since it was believed that such activities



would serve to further damage their joints.<sup>38</sup> However, current recommendations from the Arthritis Foundation include aerobic exercise when the inflammation is under control. Several studies conducted over the past years have clearly demonstrated that RA patients who participate in regular programs of aerobic exercise gain significantly in a variety of ways as compared to controls,<sup>39-44</sup> with no adverse effects on joints. Physical benefits included improvements in muscle strength and joint flexibility, increased aerobic capacity, and less morning stiffness; psychological benefits included better self-esteem and less anxiety and depression. Furthermore, decreases in the number of sick days and days in the hospital, and a reduction in drug therapies have also been noted for RA patients after participation in an aerobic exercise program. In addition, it is important to note that in RA as well as in FM, depression is common. Despite uncertainty as to whether the depression is related to the severity of the disease/disorder or an independent coexistent problem, it appears that aerobic exercise helps to control the depressive and clinical symptoms associated with RA.

Although adequate physical fitness is an important component of overall health and work capacity, persons with RA, like those with FM, are usually deconditioned and have limited cardiorespiratory function and exercise tolerance. Minor<sup>45</sup> evaluated physical fitness and work capacity in a sample of women with RA before, after a 3-month supervised exercise program, and again after 12 months. Initial evaluations supported limited function and a generalized deconditioning in all subjects. However, subjects assigned to the supervised exercise group showed considerable improvement in their aerobic capacity and exercise tolerance after the 3- and 12-month evaluations. Moreover, consistently strong associations were noted among function and aerobic capacity. Such results need to be disseminated to the medical community so exercise can be promoted as a reasonable therapy for RA.

In addition to the cardiovascular benefits of exercise training, improvements in functional measures are often noted. Two forms of exercise that appear to confer significant benefit are dance- and water-based exercises. Noreau<sup>46</sup> demonstrated a 13% (to as much as 40%) overall improvement in aerobic capacity of RA patients who participated in a 12-week modified dance-based exercise program. Moreover, a decrease in the count of painful joints, and positive changes in depression, anxiety, fatigue, and tension were demonstrated; no changes were noted in nonexercise controls. These improvements are impressive given that dance-based exercise is weight-bearing and provide further evidence that such activities are therapeutic. Similar improvements have been documented with water-based exercises, as both observational and controlled trials have documented the safety and efficacy of aerobic exercise in a water environment for persons with arthritis.<sup>47</sup>

Meyer<sup>47</sup> recently compared demographic and disease characteristics of RA patients who participated in either community-based exercise programs or clinical programs. Disability, depression, anxiety, pain, global disease severity, and grip strength scores were gathered in both groups of RA patients. Global disease severity was significantly higher and grip strength significantly lower among nonparticipating patients as compared to water aerobic participants. Participants had been attending the exercise classes for varying time periods: from only once to 22 years. Although it may be that those less severely affected by the disease are more likely to participate, it is equally possible that participants were less affected because of their regular exercise. These data reinforce the importance of identifying reasons why people attend the classes, so that segments of the population not being served by community programs are encouraged to attend. Interestingly, Gecht<sup>48</sup> recently reported that among persons with RA, a strong belief in the benefits of exercise and higher self-efficacy with respect to exercise were the primary determinants of participation. They

also found that those with greater disease severity were less likely to exercise and suggested that these groups may need special encouragement to experience the benefits of exercise.

Whereas aerobic exercise appears to benefit persons with RA, only recently have investigators addressed the potential effects of resistance training.<sup>49,50</sup> Rall<sup>50</sup> presented evidence for RA subjects (ages 25–65 years) who participated in a 12-week high-intensity progressive resistance training program. They noted significant improvements in strength (54%–75% increases), balance and gait scores and 50 foot walking times, and reductions in self-reported pain and fatigue. As with aerobic exercise, no changes in the number of painful or swollen joints were noted. These authors concluded that strength training is both feasible and safe in patients with well-controlled RA, but that medical examinations should be conducted to ensure that no contraindications to resistance training are present.<sup>50</sup> Given the short-term nature of this study, as well as others, it will be important to evaluate RA subjects over an extended period to document long-term effects on functional status and other outcome measures.

In summary, after years of research it is now well established that persons with RA can participate in regular physical conditioning programs. Participation in such programs can significantly improve cardiovascular health and fitness, muscle strength and endurance, flexibility, function, and psychological status. The final answer on clinical improvements will require further study and may depend on: the severity of the disease; the mode, frequency, intensity, and duration of the exercise; the biochemical profile of the patient; the compliance of the patient; and the duration of the disease.

## OSTEOPOROSIS

Osteoporosis, a disorder associated with aging, is characterized by extensive bone loss and places an individual at high risk for fractures. Osteoporosis affects a large percentage of women, some earlier in life than others, and may be responsible for more than 1 million fractures each year in the United States alone.<sup>51</sup> Although most common among postmenopausal women, osteoporosis is also seen in men and younger women. For example, inactivity or immobilization are well-established secondary causes of osteoporosis. In addition, athletic women who become amenorrheic appear to be at high risk for bone loss.<sup>5,52</sup> Because the incidence of osteoporosis has been increasing over the past several years, an effort to identify preventive and treatment strategies for optimizing bone mass has evolved. One preventive approach that has been used in the management of osteoporosis is regular physical activity.

A protective effect of exercise on the progression of osteoporosis has been demonstrated in numerous interventional and observational studies over the years. One of the few studies to examine the association between bone mineral density and physical activity patterns over a lifetime was recently reported by Greendale.<sup>4</sup> He examined the relation between leisure time physical activity, bone mineral density, and osteoporotic fractures in a large cohort of women and men, and found that both current and lifetime exercise were protective in terms of maintaining bone mineral density of the hip. In contrast, exercise was not protective against osteoporotic fractures.<sup>4</sup> Thus, many questions remain to be answered. For example, is there a critical time period for the exercise, and are there specific activities that optimize bone density? Cooper<sup>53</sup> recently demonstrated that one of the primary determinants of osteoporosis in women, peak bone mass, is significantly related to physical activity during childhood. Other studies support this finding.<sup>54</sup> These data indicate that physical activity patterns during the early years modulate the mineral density of bone. Thus, efforts to maximize peak bone mass may be an important preventive strategy against the future development of osteoporosis.

In terms of specific activities, it has been shown that weight-bearing and/or impact exercises are essential for maintenance of bone mineral density<sup>3,55</sup> More recent data indicate that bone responds in a site-specific way to the mechanical stress of exercise, and for optimal bone responses, the stress to the area must be greater than that which normally occurs.<sup>3,53</sup> Thus, the overload principle appears to be important, and was clearly demonstrated by Lee in their study of young athletic women. These investigators examined bone mineral density in contralateral and regional sites of swimmers, volleyball, basketball, and soccer players, and moderately active and sedentary controls. They found marked site-specific differences in bone mineral density as a function of specific sports: volleyball and basketball players had higher arm, and volleyball, basketball, and soccer players had higher leg bone mineral densities as compared to the other groups. Given that this is one of the first studies to examine regional differences, and that the study was cross-sectional in nature, the findings must be interpreted with caution. However, such information will be important for developing exercise prescriptions to enhance bone mineral status. Finally, despite a need for more definitive studies, the American College of Sports Medicine (ACSM) in 1995 after reviewing currently available data, developed a position stand on osteoporosis and exercise<sup>3</sup> that applies to women. It is the position of the American College of Sports Medicine that:

- Weight-bearing physical activity is essential for the normal development and maintenance of a healthy skeleton. Activities focusing on muscle strength may also be beneficial, particularly for nonweight-bearing bones.
- Sedentary women may increase bone mass slightly by becoming more active but the primary benefit of the increased activity may be in avoiding the further loss of bone that occurs with inactivity.
- Exercise cannot be recommended as a substitute for hormone replacement therapy at the time of menopause.
- The optimal program for older women would include activities that improve strength, flexibility, and coordination that may directly, but effectively, decrease the incidence of osteoporotic fractures by lessening the likelihood of falling.

Another issue relating to bone density is fractures from falls. Falls are the leading cause of injury-related deaths and hospitalizations in persons 65 and over, with women (approximately 1 in 3) experiencing more falls than men.<sup>56-58</sup> Recent studies suggest that inactivity among other health and lifestyle factors may be a significant risk factor associated with falls.<sup>56-58</sup> Lord<sup>58</sup> investigated the effects of a 12-month program of regular exercise in women 60-85 on dynamic stability. Women assigned to the exercise group participated for one hour twice weekly for 40 to 48 weeks; a warm-up, a conditioning, a stretching, and a cool-down period were part of each session. At the end of the trial, only those in the exercise group exhibited considerable improvement in balance range and coordinated stability tests. Because impaired stability has been associated with an increased risk of falling, the authors believe that physical activities to improve balance and stability may serve as an intervention for preventing falls. Thus, exercise may be important from several perspectives for women with osteoporosis.

## DEPRESSION AND OTHER AFFECTIVE DISORDERS

Major depression and anxiety are two of the most common disorders in the community, with adult women being affected approximately twice as often as men and also having higher rates of symptoms.<sup>59-62</sup> Prevalence estimates for major depression range between 2% and 14%,<sup>59</sup> and for generalized anxiety between 1% and 10%.<sup>61</sup> Whereas the comorbidity between mental and physical illnesses may in part account for the higher rates among women, the preva-

lence of major depression and anxiety remains higher among women than men after adjusting for other diseases.<sup>61</sup> As noted above in the sections on FM and RA, some of the symptoms of depression and anxiety associated with various disease states appear to be modified by physical activity. Moreover, the first National Health and Nutrition Examination Epidemiological Follow-up Study found that limited physical activity was associated with depressive symptoms.<sup>63</sup> In fact, regular exercise is being used more frequently as a therapy for improving mental health.<sup>64-66</sup> Many mental health scientists are convinced that both acute and chronic exercise are associated with improvements in mood and well-being.<sup>64-69</sup>

Exercise has been used in a number of different populations as a therapy for reducing depressive symptomatology: studies have included people with disabilities, various chronic diseases, and clinical depression per se. Coyle<sup>67</sup> studied persons with physical disabilities before and after a 12-week aerobic training program involving either group or home-based exercise 2 to 4 times per week for 20-40 minutes. Subjects in the exercise group were predominantly women (86%) who had experienced a cerebral vascular accident or a spinal cord injury. At the end of the 12 weeks, persons in the exercise group reported a 59% decrease in symptoms of depression as compared to a 6% increase in symptoms of controls.<sup>67</sup> Secondary benefits included a 23% improvement in aerobic fitness. They concluded that, despite limitations of the study, aerobic exercise may serve a causal role in modulating depressive symptoms. Stewart<sup>70</sup> evaluated patients over 2 years to determine whether levels of physical activity were associated with functioning and well-being. The patients ( $n = 2,471$  with 60% women) were enrolled in a large national study, the Medical Outcomes Study, and had been diagnosed with various chronic diseases. Initial analyses indicated that physical activity was primarily related to indicators of physical health, but after two years, physical inactivity was strongly associated with psychological distress, depression, anxiety, and health distress. In addition, numerous studies have examined the role of exercise in the treatment of depression per se.<sup>66,67</sup> Although the data are mixed, most studies indicate that physical activity may be associated with better mental health outcomes by reducing symptoms of depression.

Other areas of interest with respect to mental health, but with limited data, include pregnant women, women with postpartum depression, and the elderly. Koltyn presented evidence that exercise decreased state anxiety and depressive symptoms in pregnant women,<sup>71</sup> and proposed that exercise may offer a useful nonpharmacological approach to controlling the moods changes associated with pregnancy. May<sup>72</sup> presented brief evidence that women who had postnatal depression, as indicated by a screening technique, had significant decreases in anxiety and depression following 12 sessions of moderate aerobic exercise. Finally, epidemiological data from an elderly population (65-84 years) in Finland indicated that while overall participation in physical activities decreased with age, especially among women,<sup>73</sup> self-rated meaningfulness of life and health by subjective measures were positively related to regular and strenuous physical activities.<sup>73</sup> Moreover, depressive symptoms were found to be negatively related to physical exercise. It appears that involvement in physical activities by positively affecting psychological well-being, may in fact promote a higher quality of life. However, it is equally likely that a healthy psychological outlook is important for staying physically active.

## SUMMARY

The Defense Women's Health Research Initiative commissioned a review of the literature of women's health issues. This was performed and published by the

Institute of Medicine. In this publication it was noted that health promotion and disease prevention in women should be an area of high priority for military medicine. This article details some of the ways in which exercise may make substantial contributions to this goal.

The available evidence indicates that there is an inverse association between physical activity and a variety of chronic diseases. Moreover, physical activity appears to influence psychological well-being. Aerobic exercise is the mode most frequently studied, and appears to confer positive changes, but other forms of exercise may prove to be equally beneficial. However, the appropriate duration, intensity, and frequency of the exercise have not been determined for any of these chronic health problems and must be considered before global recommendations can be offered. Efforts to promote physical activity within the community, schools, and homes must be initiated to achieve the goals set forth in Healthy People 2000, so the health of our women can improve. Future studies will be required to identify mechanisms whereby physical activity confers benefit.

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# Chronic Dieting in Active Women: What Are the Health Consequences?

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For millions of American women dieting or "watching-their-weight" has become a way of life. In fact, two national surveys report that 38%–40% of American women diet.<sup>1,2</sup> This unrelenting obsession with body weight and shape is fueled primarily by the sociocultural and psychological pressures placed on women to be thin.<sup>3,4</sup> One unfortunate consequence of this national obsession with thinness is that many women feel they are judged on physical appearance instead of their skills, knowledge, or capabilities.<sup>3–5</sup> Thus, thinness has become a symbol of beauty, acceptance, and competence for women.<sup>5</sup> In addition, women often report that their self-esteem and self-worth are linked to how they look and how much they weigh.<sup>3,6</sup> Consequently, it is not surprising that women frequently say that their mood for the day is determined by the morning encounter with the bathroom scale. Because of these pressures, women often strive to be thinner than what may be realistically achievable. In an attempt to achieve this elusive thinness, many women will try almost any weight loss strategy. Some of these strategies include restrained eating, chronic energy restriction, excessive exercise, or various other unhealthy dietary practices.<sup>1,7–9</sup> Unfortunately, most attempts at long-term weight loss fail<sup>10–12</sup>; thus, many women remain heavier than the current sociocultural ideal.

Active females in the military, like most women in our society, are often concerned or preoccupied with their body weight and shape. They too feel pressure to conform to certain "ideal" body shapes and sizes. Nevertheless, their source of pressure is twofold. Not only are these women burdened by the general sociocultural demands to be thin placed on them, but they are also expected to be physically fit<sup>13</sup> and meet military weight standards.<sup>14,15</sup> Failure to meet these weight standards can result in severe consequences such as reduction in rank, reduction in pay, and/or discharge from active duty.<sup>16</sup>

The purpose of this article is to review the possible health consequences of chronic dieting in active women. First, the prevalence of dieting in America will be discussed and the pressure placed on all women to be thin at an increasingly young age will be reviewed. Then the characteristics of various types of dieters will be described. Finally, the nutritional and health consequences of chronic energy restriction or restrained eating in active women will be reviewed.

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## DIETING IN AMERICA

Dieting is a way of life for many American women. It is now estimated that 40% of all adult women are trying to lose weight.<sup>1,2</sup> Ironically, of those who reported wanting to lose weight, 20% consider themselves the "right weight" and 4% are underweight.<sup>1,2</sup> Thus, many of the women currently dieting do not need to diet, since they are not overweight. Certainly, these individuals would benefit more from practicing sound nutrition and exercise habits than from trying to diet for weight loss. Conversely, NHANES III reports that 35% of women are overweight (body mass index >27.3) but only about half of these women are trying to lose weight.<sup>17</sup> Thus, a health paradox exists in America.<sup>18</sup> Those women that do not need to lose weight are dieting, and those that would benefit from weight loss are not successful.

As adult women have become more focused on body weight and body image, the number of young females dieting for weight loss has also increased. A 1993 National Institute of Health (NIH) symposium on eating disorders reported that 60% of young girls in grades 1-5 developed distorted body images and overestimated their body weight.<sup>19,20</sup> They also reported that 70% of females diet between the ages of 14 and 21 years. Other surveys support these data. The 1990 Youth Risk Behavior Survey reported that 44% of females in grades 9-12 were trying to lose weight.<sup>2</sup> In addition, a recent survey by Emmons<sup>21</sup> on dieting practices in female high school seniors (n = 780) reports that 73% were dieting (achieving >5 pound weight loss). Emmons<sup>21</sup> also observed that the primary distinguishing feature between dieters and nondieters was that the dieters had a perception of being overweight. Thus, the dieters had a greater feeling of body dissatisfaction and the desire to be thin, although they were not necessarily overweight. These studies suggest that the cultural conditions and pressures for women to be thin begin at an early age. Unfortunately, the type of dieting practices used by young people are often unhealthy and potentially harmful.<sup>2,22</sup> In addition, data now indicate that young females concerned about body weight and image are more likely to smoke.<sup>5,23</sup> Thus, inappropriate dieting may help to establish unhealthy behaviors in young females that are carried into adulthood and negatively influence lifelong health.

## TYPES OF DIETERS

The chronic dieter is usually defined as an individual who consistently and successfully restricts energy intake to maintain an average or below average body weight.<sup>7,8</sup> This type of dieter is frequently referred to as a "restrained eater" and may be at greater risk for poor nutrient intakes and health problems than the weight cyler or "yo-yo" dieter. The weight cyler is the individual who successfully diets to lose weight, then regains the lost weight, and then repeats the cycle again. These individuals are unsuccessful at maintaining long-term weight loss. Factors that trigger these individuals to cease "watching their weight" are numerous but usually involve the inability to make permanent lifestyle changes. However, regardless of the cause, once these individuals cease their vigilance they eventually regain the lost weight. The long-term health consequences associated with this type of dieting, such as increased risk for cardiovascular and coronary heart disease remain controversial.<sup>24-29</sup>

## HEALTH CONSEQUENCES OF CHRONIC DIETING

For most healthy women, "going-on-a-diet" for a designated time will present few nutritional or long-term health problems.<sup>30</sup> However, serious health prob-

lems may arise for the active female who chronically restricts energy intake while expending high amounts of energy in exercise.

### **Nutrient and Energy Intakes**

One nutritional consequence of constantly dieting for weight loss is poor energy and nutrient intakes. It is well documented in the research literature that when active women have energy intakes of less than 1800–1900 kcal/day, many macro and micronutrient intakes are below recommended values.<sup>31</sup> For example, many active women have protein and carbohydrate intakes below that recommended for active individuals.<sup>32,33</sup> Thus, protein intakes are not adequate for the maintenance and repair of lean body mass and to cover the cost of protein used for energy during exercise. In addition, carbohydrate intakes are not adequate to replenish glycogen stores used during exercise. Most researchers agree that active women engaged in endurance activity have higher protein needs (1.2–1.4 g protein/kg body weight)<sup>33</sup> than the recommended daily allowance (RDA) (0.8 g protein/kg body weight).<sup>31</sup> Active females also require a minimum of 5 g of carbohydrate/kg body weight to maintain glycogen stores.<sup>34</sup> If activity is high and training occurs on a daily basis the carbohydrate needs may be greater than 8 g of carbohydrate/kg body weight.<sup>32,35</sup> Individuals with poor energy intakes usually have poor micronutrient intakes, especially calcium, iron, magnesium, zinc, and B complex vitamins.<sup>36–42</sup> These micronutrients are especially important for active individuals because they play an important role in energy production, hemoglobin synthesis, maintenance of bone health and strength, and in adequate immune function. Thus, prolonged energy restriction combined with poor micronutrient intakes can place active women at risk for poor nutritional status<sup>41–43</sup> and decreased bone density.<sup>38,44,45</sup> This is especially true if supplemental micronutrients are not used. In addition, many of these women complain of fatigue, frequent injuries, irritability, and poor athletic performance.<sup>46</sup> These complaints can frequently be reversed by increasing daily energy intake and ensuring that the individual is in a more positive energy state before beginning any physical activity.<sup>46,47</sup>

### **Body Composition and Body Weight**

Research examining the effect of dieting or “restrained eating” on body composition in sedentary women shows that dieters are usually fatter and weigh more than controls.<sup>5,21</sup> This relationship appears to be true even if the groups are of normal body weight, that is, the dieting group is still heavier and fatter than the nondieters.<sup>5,21,48</sup> However, this relationship is not observed in active women. Studies done in active women who restrict energy intake show that these individuals have similar body fat levels and body weight when compared to active women who are nondieters.<sup>49,50</sup> Thus, these active women appear to be consciously restricting energy intake and exercising heavily to maintain a body size and shape they find acceptable, and one that is similar to their nondieting counterparts.

### **Resting Metabolic Rate and Total Daily Energy Expenditure**

It is well documented that dieting reduces resting metabolic rate (RMR) greater than that predicted based on changes in total body weight and fat-free mass (FFM). Thus, if an individual is chronically dieting, total daily energy expenditure will be

reduced. Exercise has frequently been added to weight loss programs as a way of preventing the decrease in RMR observed with dieting. Unfortunately, close examination of the data shows that RMR decreases significantly with both diet and diet-plus-exercise programs in premenopausal women, but that the drop with dieting is significantly greater than that observed with diet-plus-exercise.<sup>51</sup> Thus, restriction of energy intake, with or without exercise, reduces metabolic rate below that predicted. This in turn means that fewer calories are required to maintain body weight.

One study that illustrates the effect of severe dieting (520 kcal/day) and exercise on RMR and FFM was done by Donnelly et al.<sup>52</sup> Female subjects were assigned to one of six dieting groups for 12 weeks: control (diet only); endurance exercise (4 days/week of treadmill walking or cycling at 70% heart rate reserve); weight training (3 days/week using 6–8 reps at 70%–80% of one-repetition maximum); endurance plus weight training; control for 4 weeks with subsequent endurance exercise; weight training for 4 weeks with sequential endurance exercise. The results showed that weight loss did not differ between the groups and ranged from 16.7% to 22.3% of baseline. However, the endurance exercise plus weight training group had the greatest decrease in RMR (240 kcal/day decrease) over the 12-week period ( $P < .05$ ), while the amount of FFM lost was similar to that lost in the other groups (4 kg). Thus, in the presence of severe energy restriction, it appears that neither endurance exercise nor weight training, or the combination of the two exercise modes are able to increase weight loss or slow the decrease of FFM or RMR compared to dieting without exercise. In fact, the group with the highest exercise energy expenditure (ie, the greatest negative energy balance) had the greatest decrease in RMR while on the 12-week diet.

### Psychological Stress

The psychological consequence of severe energy restriction depends on a number of factors and may vary from person to person. Some of the psychological stresses reported with severe dieting are increased depression, obsession with food and body weight, increased incidence of binge-purge eating behaviors, increased stress of constantly trying to “make weight” or maintain an unrealistic body weight, and increased risk of developing more severe eating disorders.<sup>7,16,53–55</sup> In addition, chronic dieters or individuals in chronic negative energy balance complain of poor ability to concentrate, fatigue, poor performance, and the interruption of sleep patterns.<sup>46,55</sup> All of these factors can dramatically change the way the dieter performs daily functions such as interpersonal relationships, working, studying, and physical activity.

### Disordered Eating Behaviors

The pressure to be thin at any cost can lead some active females to develop disordered eating behaviors.<sup>16,56</sup> These behaviors can range from subclinical eating disorders to clinically diagnosed anorexia nervosa or bulimia.<sup>7,57</sup> New data suggest that many active women may have subclinical eating disorders, as evidenced by their preoccupation with food, calories, body shape, and weight. However, these women do not have all the criteria necessary to classify them with a clinical eating disorder.<sup>7,58–60</sup> Some of the trigger factors associated with the onset of an eating disorder in active women can include the following: prolonged periods of dieting, frequent weight fluctuations, a sudden increase in training volume, a traumatic stressful event, and/or pressure placed on the female to maintain or achieve a low body weight.<sup>16,59</sup>

One study done in military personnel illustrates this point. Peterson et al<sup>16</sup> examined the presence of bulimic weight-loss behaviors in individuals enrolled in three weight-management programs: a military weight-management program ( $n = 51$ ), a civilian weight-management program ( $n = 53$ ), and a comparison military (normal weight) group ( $n = 51$ ). The military weight-management group was made up of United States Air Force (USAF) members who were mandated to enroll and required to lose weight or face possible administrative or discharge action. Individuals in the civilian weight-management group were volunteers. The study included both males ( $n = 78$ ) and females ( $n = 77$ ). Results showed that the military weight-management group engaged in bulimic weight-loss behaviors two to five times more often than the comparison groups. They engaged in vomiting, strenuous exercise, and use of the sauna/steam room for weight loss four times as often as the civilian weight-management group. Comparison of males and females within the USAF military weight-management group showed that there were no statistical differences in the reported bulimic weight-loss behaviors. However, when examining overeating behaviors, women in the military weight-management program reported engaging in binge eating twice as often as males (males = 42%; females = 81%). Finally, more individuals (53%) in the military weight-management group reported losing at least 10 pounds in a month compared to the other groups (18%). The results were similar when they examined the number of individuals gaining 5 pounds in a week. At least 41% of the military weight-management group reported doing this compared to only 27% in the civilian weight-management group and 14% in the control group. The authors concluded that bulimic weight-loss behaviors may develop in individuals who feel extreme pressure to lose weight. Thus, under pressure to lose weight or face possible discharge, these USAF soldiers resorted to excessive and unhealthy weight loss measures.

### **Exercise Performance**

Research examining the effect of chronic energy restriction on exercise performance comes from studies examining athletes involved in aesthetic or lean-build sports, such as dancers, gymnasts, and wrestlers.<sup>53,61</sup> These individuals are constantly pressured to maintain a lean body shape for their sport; thus many of these athletes chronically diet. In addition, these athletes are thinner and typically report higher incidence of body image distortions and dieting behaviors than athletes participating in sports allowing more normal builds such as basketball, volleyball, or downhill skiing.<sup>7,62</sup> These athletes also report poor energy intakes, increased risk of injury, poor ability to concentrate, and prolonged recovery time from injuries when compared with athletes in normal-build sports.<sup>7,61</sup> For the active female, poor physical performance can have a devastating psychological effect, especially if physical performance is tied to job-related expectations as they are in the military.<sup>13</sup>

### **Menstrual Dysfunction**

There is a growing body of evidence suggesting that athletic amenorrhea, and other reproductive hormone abnormalities seen in active women, may be due in part to periods of energy deficiency.<sup>46,63-67</sup> Negative energy balance in the active female is most likely due to three factors: high energy expenditure, low energy intake, and high psychological and physical stress. It now appears that changes in the menstrual cycle, as a result of high exercise energy expenditure and/or periods of negative energy balance, are an energy conserving strategy to protect more

important biological processes.<sup>64,68</sup> Although many in the medical field disregard exercise induced menstrual dysfunction, the prevalence in active women may be as high as 50%.<sup>69</sup> Thus, the possibility that an active female may have some type of menstrual dysfunction is high and cannot and should not be ignored.

Researchers have examined the effect of negative energy balance on the menstrual cycle and reproductive hormones by investigating the role of diet (energy restriction) alone, exercise alone, or diet plus exercise. Human studies examining the effect of energy deprivation on reproductive abnormalities report that energy restriction can alter the hormonal profiles and the menstrual cycles of healthy women.<sup>63,65</sup> The magnitude of energy restriction and the body's level of energy reserves before dieting begins may influence the degree of menstrual dysfunction that occurs with energy restriction. The impact of energy restriction on menstrual function may also depend on an individual's initial hormonal status before dieting begins.<sup>66</sup> In other words, if an individual already has luteal phase deficiency or is anovulatory, dieting may cause the expression of amenorrhea more quickly as compared to others who begin the diet with normal menstrual function. Finally, studies also show that diet plus exercise regimens severe enough to produce a significant weight loss will also produce the greatest changes in menstrual function.<sup>67,70</sup> Thus, this combination has a more negative effect on menstrual status than just exercise or diet alone. This may be due in part to the greater negative energy balance and resulting weight loss that occurs when dieting is combined with high exercise energy expenditure.<sup>67</sup>

It has now been well documented that menstrual dysfunction in active women, especially amenorrhea, can significantly affect long-term health. If active females develop menstrual dysfunction due to restrictive energy intakes and active lifestyles, then significant health problems can develop.<sup>64</sup> Two of the most well documented health problems are decreased bone mineral density<sup>71-74</sup> and increased musculoskeletal injuries.<sup>75</sup> Studies show that axial bone mass is reduced by approximately 20% in amenorrheic athletes compared to eumenorrheic athletes, and by 10% compared to sedentary women with normal menstrual cycles.<sup>38,44,45,76,77</sup> Thus, it is imperative that the active female be appropriately educated regarding the adverse effects of menstrual dysfunction and the treatments available. Remember that the most appropriate form of treatment for exercise or diet induced menstrual dysfunction lies in its prevention.

## SUMMARY

Evidence suggests that there is ever increasing pressure on American women to be thin. This pressure drives women to want to be thinner than what might be realistically achieved or required for good health. Our goal as nutrition and health professionals is to help women achieve and maintain a healthy body weight throughout the life-cycle. This includes helping young females accept their body size and shape as well and placing more emphasis on health and fitness than on weight in this population. This process begins with the identification of what constitutes a healthy body weight for a particular individual based on genetic, physiological, social, and psychological factors. In addition, it should be a weight that can be realistically maintained while keeping risk factors for chronic disease low. Table 1 outlines some strategies for helping individuals to identify and maintain a healthy body weight.



**Table 1. TECHNIQUES FOR IDENTIFYING AND MAINTAINING A HEALTHY BODY WEIGHT THROUGHOUT THE LIFE-CYCLE**

- 
- I. Put emphasis on personal health and well-being, not weight.  
Less focus on the scale and more on healthy habits such as regular exercise, stress management, and making good food choices.  
Set realistic weight goals. (What is the maximum weight for your height that would be acceptable and reduce risk of chronic disease? What was the last weight you could maintain without constantly dieting? What weight is the maximum weight acceptable by the military?)  
Mark progress by measuring changes in fitness level, health parameters (positive changes in blood pressure, glucose, lipids, etc), and general overall well-being.  
Make lifestyle changes that help you maintain a healthy weight for your self—not your job, your spouse, your friends, or to prove a point.
- II. Make changes in diet and eating behaviors.  
Do not constantly deprive yourself of favorite foods or set unrealistic dietary rules or guidelines.  
Make basic dietary changes that reduce energy intake, that fit into your lifestyle, and that you know you can achieve.  
Reduce fat intake but remember a lower fat diet will not guarantee weight loss if a negative energy balance (reduced energy intake and increased energy expenditure) is not achieved.  
Eat more whole grains, cereals, fruits, and vegetables.  
Make sure adequate dietary fiber is consumed (>25 g/d).  
Do not skip meals or do not let yourself get too hungry.  
Reduce or eliminate late night eating (after 8 p.m.) if possible.  
Eat something for breakfast. This will prevent you from being too hungry and overeating at lunch.  
Plan ahead and be prepared for when you might get hungry. Always have good food available when and where you get hungry.  
Identify your own dietary weaknesses and plan a strategy for dealing with these difficult times.  
Remember you are making lifetime dietary changes that will result in weight loss. You are not going on a diet that you will someday go off.
- III. Make changes in exercise behaviors.  
Start and maintain a regular exercise program. This is an absolute requirement for the maintenance of a healthy body weight.  
Pick an activity or activities that you enjoy and that you can do on your own.  
Pick an activity that is inexpensive and does not require fancy equipment.  
This means you will maintain your fitness program even when you are traveling and away from home.  
Find an exercise partner or exercise class to get you started, motivate you, and get you through the difficult days until exercise is part of your lifestyle.  
Participate in group exercise activities whenever possible.  
Plan regular exercise into your day and add additional exercise by walking instead of driving, or using the stairs instead of the elevator.  
Realize that you are making a lifetime change and a lifetime commitment to yourself for good health and weight management.
- 

Since the military demands that soldiers meet body weight standards, it is imperative that they also provide accurate and motivating diet and exercise education programs to help soldiers achieve these standards. For the female soldier the pressure to maintain a thin body is twofold: both from society and the military. Research shows that when pressures to achieve a weight goal are high, women will attempt any weight loss method to achieve success, regardless of health

consequences. Thus, any successful weight-loss or weight-maintenance program needs to address lifestyle changes that can help soldiers achieve and maintain healthy weight and fitness goals throughout their military careers.

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# Vaginitis/Cervicitis: Diagnosis and Treatment Options in a Limited Resource Environment

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**V**aginal and cervical infections, particularly by sexually transmitted organisms, are a common and important health-related problem to military women. These infections not only affect the mental and physical health of women, they may adversely affect the ability of military women to perform their duties. These infections frequently produce symptoms sufficient to cause pain, irritation, foul odor, discharge, intense itching, and even sleep loss. These conditions and symptoms may also cause embarrassment to women working and living in close quarters, and also lead to decreased productivity and time off from the workplace for evaluation, diagnosis, and treatment. All of these factors may significantly impact the ability and readiness of military women to perform their assigned tasks and duties. Furthermore, the adequately trained health care providers, laboratories, and advanced technology required for rapid diagnosis and treatment of these conditions may not always be readily available to deployed military women especially while in remote areas or developing countries. Speculum examination requiring special tables, stirrups, directed lighting, and other specialty equipment may not be easily accessible in many deployment situations.

## SCOPE OF THE PROBLEM

Vaginitis and cervicitis occur in upward of 12 million women each year in the United States.<sup>1,2</sup> These infections occur most commonly in the 2nd, 3rd and 4th decade of life. The prevalence of these infections is highest in the 17–25-year-old age group, particularly the sexually transmitted diseases (STDs). Thus, these infections will commonly occur among women in the U.S. Armed Services by virtue of their age range alone. Additional considerations including socioeconomic background, increased frequency of sexual activity, numbers of partners, and prevalence of STDs in their partner pool will enhance the risk of military women over the civilian population at large. For example, military

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women are more likely to meet and choose other military personnel as their sexual partners and there are sufficient data to indicate that deployed military men frequently engage in high-risk sexual behavior and contract STDs. In one study, of 1,744 military men deployed aboard ship for 6 months to South America, West Africa, and the Mediterranean, 49% reported prior sexual contact with a commercial sex worker and 22% reported a history of an STD before deployment.

During the subsequent 6-month deployment, 42% reported sexual contact with a commercial sex worker, 10% acquired a new STD, and 10% reported inconsistent condom use.

Recent preliminary reports from a survey of Army personnel indicate that 18% of women respondents report having had at least one STD over a 2-year period and this may be an underestimate, especially if women with an STD history were less likely to respond to the survey.<sup>4</sup> In another study of 476 asymptomatic active duty army women presenting for routine pap smears, 39 (8.2%) tested positive for chlamydia;<sup>5</sup> this is a high rate of asymptomatic chlamydia infection. These statistics are further compounded by the fact that only about 50% of all unmarried military personnel reported using a condom during their last intercourse and women under the age of 25 (the age group at highest risk for acquiring an STD) account for two-thirds of the enlisted women that are pregnant at any given time.

There is additional accumulating evidence that other, less obvious factors may influence the high rate of STDs among military women. Statistics show that 31% of women on active duty in the U.S. Army smoke cigarettes of which 17% are heavy smokers. This is significantly higher than the number of smokers in the general population.<sup>4</sup> Several recent studies have demonstrated that smoking is a significant risk factor in the acquisition of numerous STDs including *Chlamydia trachomatis*, *Neisseria gonorrhoeae*, and pelvic inflammatory disease and its sequelae.<sup>6-8</sup>

Delayed diagnosis and treatment of STDs and urinary tract infections may very well lead to significant, even life-threatening, long-term sequelae. Serious upper genital tract infections, permanent infertility, and life-threatening ectopic pregnancies are all recognized and well-documented sequelae of lower urogenital tract infections in women.<sup>1,2</sup> Recent studies also indicate that the presence of these cervical/vaginal STDs significantly increases the risk of human immunodeficiency virus (HIV) acquisition.<sup>9,10</sup>

## CHARACTERISTICS OF THE INFECTIONS

The most common symptom of both vaginitis and cervicitis is an abnormal vaginal discharge. The patient is unable to discern cervical from vaginal infection. The sexually transmitted organisms *N. gonorrhoeae* and *C. trachomatis* are responsible for most cases of cervicitis while *Trichomonas vaginalis*, *Candida* species, and bacterial vaginosis account for nearly all cases of infectious vaginitis/vaginosis.<sup>2-4,11,12</sup>

Chlamydial infections are the most common bacterial STDs in the developed world. There are an estimated 4 million chlamydial infections annually in the United States alone with over 2 million occurring in women.<sup>2,13,14</sup> Over one million cases of gonorrhea occur in the United States each year.<sup>2</sup> Presenting complaints include vaginal discharge, dysuria, and abnormal uterine bleeding. Both gonorrhea and chlamydia can and often do present with minimal or very subtle symptoms necessitating screening and/or testing for minimal symptomatology in the "at risk" populations. Sequelae of these infections include pelvic inflammatory disease, ectopic pregnancy, permanent infertility, and chronic, often debilitating pelvic pain.<sup>2,14</sup>

Infectious vaginitis and vaginosis account for some 8–10 million outpatient visits a year in the United States.<sup>15</sup> The three conditions accounting for the vast majority of these cases are trichomonas vaginitis, candida vaginitis, and bacterial vaginosis. Vaginal yeast infections commonly occur in women. It has been estimated that 75% of women will have at least one episode of yeast vulvovaginitis, with 40–45% having 2 or more episodes.<sup>16</sup> The predominant organism causing these infections is *Candida albicans*, and occasionally non-albicans candidal species (*Candida tropicalis*, *Candida* [Torulopsis] *glabrata* or other *Candida* species). The most common presenting complaint is vaginal and/or vulvar pruritis with or without vaginal discharge; however some 30% of women with yeast infections may present with discharge alone.

An estimated 3 million cases of trichomoniasis occur in the United States annually. This infectious form of vaginitis is caused by *T. vaginalis*, a sexually transmitted motile protozoan. It accounts for approximately 10–15% of all cases of clinically evident vaginal infections. Infection with this organism is most often characterized by a copious, foul-smelling discharge but the clinical presentation can be quite variable including a significant number of women without specific vaginal complaints.

Bacterial vaginosis (formerly known as Gardnerella vaginitis, Haemophilis vaginitis, or nonspecific vaginitis) is the most common cause of malodorous vaginal discharge in women.<sup>16</sup> It has been estimated to be the etiology in as many as 45% of women with vaginitis/vaginosis.<sup>18</sup> Bacterial vaginosis (BV) is caused by a shift in the vaginal flora from the normal high concentrations of hydrogen peroxide-producing lactobacilli to a mixed flora consisting of a high concentration of anaerobic organisms, *Gardnerella vaginalis*, and *Mycoplasma hominis*.<sup>19</sup> This shift in flora is associated with a homogenous, white vaginal discharge, elevated pH (>4.5), the production of amines, and the presence of clue cells.

## GOLD STANDARD DIAGNOSIS OF CERVICAL/VAGINAL INFECTIONS

The clinical presentation of cervical/vaginal infections in women is highly variable ranging from asymptomatic to debilitating symptoms from deep-seated infection. The more common presentations include symptoms such as persistent and often foul-smelling vaginal discharge, intense vulvovaginal pruritis and irritation, dysuria, and/or pelvic pain. Diagnostic accuracy based on clinical symptoms alone varies dramatically and is quite subjective. Clinical suspicions are confirmed with specific laboratory or office-based microscopic tests. The laboratory test with the greatest sensitivity and specificity will be considered the "gold standard." While there is no official listing of the "gold standard" laboratory tests for a given organism or condition, there are a number of tests which are considered to have the highest sensitivity and specificity (shown in Table 1).

**Table 1. GOLD STANDARD**

Infection	Pathogen	Gold Standard Test
Cervicitis/urethritis	<i>Chlamydia trachomatis</i>	Polymerase chain reaction, culture
	<i>Neisseria gonorrhoeae</i>	Culture
Bacterial vaginosis	Multiple	Gram stain
Candida vaginitis	<i>Candida</i>	Culture
Trichomoniasis	<i>Trichomonas vaginalis</i>	Culture



These confirmatory tests are often expensive and take from a few days to as much as a week before a definitive result is available. It is crucial that rapid, relatively inexpensive, and reasonably accurate diagnostic tests be developed. They would have to be reliable, sensitive, and specific to minimize overtreatment as well as undertreatment.

## RAPID TESTS

Each of the cervical/vaginal infections in women have some characteristics—either clinical, microbiological, or immunological, which may be exploited in the development of simple, rapid diagnostic testing.

Chlamydia, gonorrhea, and trichomoniasis all induce the migration of inflammatory cells when they infect the lower female genital tract. Lactoferrin is a stable iron-binding glycoprotein found concentrated in secondary granules in inflammatory cells but not found in lymphocytes or monocytes.<sup>20,21</sup> This represents an ideal marker for inflammatory cells which have migrated to the lower genital tract in response to these infections. Preliminary investigations correlating genital tract lactoferrin levels with chlamydia, gonorrhea, and trichomoniasis have been reported in abstract form but have yet to appear in the literature.

Two consistent characteristics of women with bacterial vaginosis are the high vaginal pH and the presence of amines.<sup>19,22</sup> The vaginal pH is raised as the glucose fermenting lactobacilli (which produce lactic acid) are replaced with a mixed flora whose metabolic byproducts are less acidic. The vaginal pH is the most sensitive of the tests for bacterial vaginosis but it lacks a high degree of specificity. The amine odor test is based on the release of amines (putrescine, cadaverine, trimethylamine) following alkalization with 10% potassium hydroxide. The sensitivity of this test has been reported to be as high as 87% with 98% specificity.<sup>23</sup>

The currently used diagnostic tests also require a speculum examination. This requires an experienced clinician as well as specialized equipment including a pelvic exam table with stirrups. We have recently completed several studies utilizing self-collected vaginal specimens to diagnose chlamydial, gonococcal, and trichomonal infections. In the first of these studies vaginal (introital) swabs were collected from 300 women by the clinician.<sup>24</sup> In 200 of these women a self-collected introital sample and a urine sample were also submitted for chlamydial polymerase chain reaction (PCR) testing. Women were instructed on proper introitus specimen collection by the study personnel, with a pictogram provided as additional reference. Self-collection was performed in strict privacy. The patient placed a dacron-tipped swab 1 inch into the distal vagina for 10 seconds. The swabs were then placed by the patient into PCR transport media. Women then underwent pelvic examination, and cervical, urethral, and vaginal specimens were obtained for chlamydia PCR, culture, and enzyme immunoassay (EIA). Women were considered to be infected with chlamydia if any site was positive by culture or in addition, they were positive by PCR and negative by culture with confirmation by PCR with a second primer. Overall, 37 (12.3%) of the women were infected with *C. trachomatis*. The sensitivity of PCR on introital samples was 92% and the specificity was 100%. This technique performed as well as any other method of collection and testing including: endocervical PCR, endocervical culture, endocervical EIA, urethral PCR, and urethral culture. Among the 200 women who self-collected vaginal introital samples, again the sensitivity and specificity was as good or better than samples collected from any other site. The self-collected samples had a lower sensitivity (81 vs 92%) compared to clinician-obtained samples. We have improved our patient instruction materials to increase self-collection sensitivity to optimize diagnostic accuracy.

In subsequent studies we have evaluated this sampling site for the diagnosis of gonorrhea and trichomoniasis. In a study of 100 women undergoing vaginal introitus sampling for *N. gonorrhoeae* and tested by PCR, we found a sensitivity of 100%.<sup>25</sup> This was equivalent to endocervical culture and better than endocervical or urethral PCR (82% and 64% sensitivity, respectively). In our evaluation, 100 women were tested for *T. vaginalis* by PCR; all 15 women positive for this organism by culture and/or wet mount were identified by PCR of samples obtained by swabs from the vaginal introitus.<sup>26</sup>

These data strongly support our contention that vaginal introitus samples can be used to accurately diagnose chlamydial, gonococcal, and trichomonal infections in the lower female genital tract. Furthermore, the self-collection of vaginal introital samples was successful (no patients were unable to collect the samples), well accepted by the women, and may well enhance their willingness to undergo testing by imparting an element of privacy to specimen collection. The vaginal introitus sampling site provides easy access to vaginal secretions containing exfoliated cells from the lower genital tract, soluble cell products, and frequently organisms as well. Obtaining these samples is no more difficult than inserting a tampon, and can easily be accomplished by most women in a minute or less during a visit to a restroom. Therefore, self-collection is a feasible strategy for military women especially in a setting with suboptimal conditions.

## TREATMENT OPTIONS

A single dose of azithromycin, an azalide antibiotic, is as effective as doxycycline for 1 week as a treatment for chlamydial infection.<sup>27</sup> It has further been shown to have good efficacy in eradicating lower genital tract gonorrhea when used in a 2 g dose. However, at this higher dose, significant gastrointestinal symptoms were reported in 35% of patients.<sup>28</sup> Studies of the efficacy of the lower 1 g dose in eradicating *Neisseria gonorrhoeae* have been variable. In one study 25 of 27 (93%) of patients were cured with a single 1 g dose.<sup>29</sup> In another study 76 of 82 (93%) of males were cured with gonococcal urethritis.<sup>30</sup> Other smaller studies have suggested lower efficacy. Further studies are underway to determine if a 1 g dose will be sufficient to adequately treat uncomplicated gonorrhea. At present, additional coverage is necessary for effective eradication of gonorrhea.

The vast majority of yeast infections (80–90%) respond to standard, single or multiple dose antifungal agents. Oral fluconazole in a single 150 mg dose has been shown to be an effective treatment for vaginal candidiasis with low toxicity and minimal side effects. In a review of 14 comparative and 14 non-comparative clinical studies conducted in 19 different countries a total of 3,929 patients were treated with fluconazole.<sup>31</sup> A clinical response was demonstrated in 94% of the patients with a mycological cure in 85%. The drug was well tolerated and no serious adverse effects were reported in any of these trials.

Metronidazole has long been the treatment of choice for trichomoniasis, most often administered in a 2 g single dose with cure rates between 86% and 97%.<sup>32</sup> It has also been highly effective in the treatment of bacterial vaginosis with cure rates reported between 84% and 95%, depending on whether treatment was with a 2 g dose (84%) or a 7-day regimen.

## CONCLUSIONS

Technology and data now exist to diagnose cervical and vaginal infections in women with a fairly high degree of accuracy, but most of this technology is not available in a form that is currently useful in a limited resource environment.

However, it is feasible using currently available and evolving technology to develop simple, rapid, and sensitive self-tests for the most common treatable cervical and vaginal infections in women. This would utilize self-sampling techniques and currently available dipstick tests combined with other tests in development (eg, rapid lactoferrin determinations). Single agent treatment regimens could be assigned according to test results. Considerable research to provide a usable test kit and to determine its diagnostic accuracy needs to be done.

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## Selected Talks From the *Forum on the Health of Women in the Military*

### POSTTRAUMATIC STRESS DISORDER IN WOMEN VETERANS

Jessica Wolfe, PhD

The prime victims of most interpersonal violence by people known to them are women. The common myth is that with increasing violence in this country, women are very subject to rape by strangers. In fact, Department of Justice reports show that only 15% of rapes actually are stranger rapes. The remaining 85% are committed by people known to the victim. These background facts are important in analyzing and understanding data on posttraumatic stress disorder (PTSD) in women. The problem is a societal one, and the solution should be oriented to prevention and addressed on a public health level. This is in contradistinction to the level at which we are sometimes reduced to dealing with it, as a psychiatric or mental health problem for women.

Very recently, Kessler published a national co-morbidity study in the *Archives of General Psychiatry*. It contains the most current update on rates of posttraumatic stress disorder in men and women in the United States and is based on general community samples that include military populations. In a cohort of 5,800 people, age range 15–54, the study revealed that posttraumatic stress reactions are far more prevalent in U.S. society than previously thought. The estimated lifetime rates are about 7.8%, whereas previous estimates had suggested they were as low as 1–2%. To put that in some perspective, the rate of schizophrenia in this country is estimated to be 1%, so this is a fairly common problem. Kessler also found that in a total lifetime prevalence rate of 7.8%, men only had roughly half the rate of women. They have 5%, whereas 10.4% of women had PTSD at some point in their life.

There is some debate in this study as to why that might be the case. Women are exposed frequently to different types of events than are men, and this is probably one underlying reason why women get higher levels of posttraumatic stress symptomatology. Although this study preliminarily suggests that women have some kind of greater vulnerability to getting PTSD, this vulnerability is not necessarily biological. It could be social, if women are at greater risk for certain interpersonal events. In support of this are other studies that show comparable rates of posttraumatic stress between men and women when they are exposed to the same trauma: for example, a natural disaster.

The most prevalent traumatic stressor encountered by women in this country and possibly the world, although I don't think there are empirical data on it, is sexual assault. During 1992 in this country alone, 680,000 women were raped, and an additional 1.7 million women were nonsexually assaulted. Ex-

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trapolating those data longitudinally reveals that 12 million U.S. women have been raped at least once in their lifetimes. Furthermore, the most common aftermath of the sexual assault is the development of posttraumatic stress disorder.

Although technically a person has to have had the symptoms for 4 weeks to make the diagnosis of PTSD, 2 weeks after sexual assault, 90% of female rape survivors will meet criteria for PTSD. That extraordinarily high rate after 3 months drops down to 50–60%, so there is a good recovery. In the course of a lifetime, a sexual assault victim has a likelihood of developing PTSD of about 31%. So about one in three female survivors of rape will develop post-traumatic stress from the event at some point in their lifetime.

What about posttraumatic stress in women in the military? The first data on rates of actual posttraumatic stress in women in military service are from the Vietnam War and come from the national Vietnam veterans readjustment study published in 1988. The study did not ask about experiences of sexual harassment or assault during military service or Vietnam deployment but did focus on personal lifetime threat from rocket or mortar attack, extensive viewing of death and dying or gross dismemberment, and so on. Women, in fact, had appreciable rates of posttraumatic stress related to their wartime service 20 years after the war's end. In 1988, about 8.5% of women who served in the Vietnam theater still had posttraumatic stress, and an additional 7.8% had partial symptoms of the disorder. This rate is about half that of male combat theater veterans from Vietnam, in whom posttraumatic stress disorder rates from the war were about 15.2% for full diagnosis and in whom about another 11% had some symptoms.

In 1991 we had the opportunity to begin following a cohort of Persian Gulf War veterans. We are now in our 5th year of following up a sample of almost 3,000 Army personnel, who comprise active, reserve, and guard units that were deployed to the Persian Gulf in January through April of 1991 from Fort Devens, Massachusetts. Our original intention was to interview them about their general psychological adjustment immediately when they came back from the Gulf and to go forward with them prospectively, learning how men and women readjusted following the rapid deployment.

About 1½–2 years later, we had about 78% of the sample still responding to our survey. Naively, we did not think to ask about questions related to interpersonal violence at the time but concentrated on more “traditional” war-zone stresses. So in our naivete, we found what might be expected, although different from the Vietnam data. Within 5 days of coming back to this country, women had significantly higher rates of posttraumatic stress symptoms than did men in our cohort, and this difference persisted at 2 years when we saw them again.

I had grave concerns about presenting data such as these because it was around the time that the whole issue of women in the combat zone and women in various medical occupational specialties was being debated. I was really not interested in providing data to suggest that women in some cases were a psychiatric liability, particularly when we knew nothing about why this might be so.

We looked at what predicted posttraumatic stress disorder at time one. It did look like female gender was a risk factor, but why? We looked at post-traumatic stress disorder at time two, 2 years after the Gulf War return, controlling for symptom levels at time one. What predicted posttraumatic stress disorder? Low levels of family cohesion, few social supports, and a lot of stressors or traumas occurring after coming back from the Gulf appeared to contribute to developing posttraumatic stress 2 years after the Gulf War. But gender didn't. So what happened?

It seemed to relate to something that happened earlier—something we hadn't been paying any attention to. So we went back, and we started thinking about some of our work with veterans of the Vietnam era. Obviously women, like men, are exposed to varying levels and varying types of war-zone stress, just as they are during regular military activity.

However, given all the data on sexual violence in this country, why had we not been thinking about rates of sexual victimization during military service? We looked at some data we had from Vietnam, and we found that exposure to more traditional forms of war trauma and sexual victimization during military service in women contributed to getting posttraumatic stress symptoms in female Vietnam veterans. Further, incidence of sexual assault and violence appeared to span theater and area samples, suggesting that this is not simply a wartime problem, but a problem in the military and in U.S. society at large. Third, our sample had moderately high rates of childhood abuse, and this abuse itself was in some cases a distinct additional risk factor for post-traumatic stress following adult military sexual trauma.

This is not a unique issue for the military. This is an issue that has now been verified in a number of studies in the U.S. A study by Martindale, conducted by the Department of Defense, found about a 5% rate of actual or attempted rape and much higher rates of physical harassment. A past-year prevalence rate for the U.S. would be 2.3%, so military samples may have slightly higher rates of sexual victimization.

We needed to ask more questions of our Persian Gulf veterans about sexual harassment and assault experiences. The vast majority of women reported no such event during their deployment, but 33% said they had some form of very explicit verbal harassment. A fifth of our sample had some discrete experience, one or more, of physical harassment during their deployment, and 8% of our sample had experienced attempted or completed sexual assault, that is, rape, during their Gulf deployment.

Now, that doesn't seem so much higher than the Martindale data or the U.S. data, except for one thing, which is that our Army sample was only in the Gulf for an average of 3.1 months. The other proportions reported are past-year prevalence, so they are year-long rates. So the Gulf data are significantly higher.

The Mississippi scale is a measure of posttraumatic stress disorder symptoms anchored to the *Diagnostic and Statistical Manual* criteria for post-traumatic stress disorder. As might be expected, as you go up the sexual harassment and sexual assault scale toward higher levels of severity of interpersonal violence, you get, not surprisingly, more symptoms of posttraumatic stress, with the most significant and highest levels coming in women who have experienced actual assault.

The combat or other stressor exposures these women had during the Gulf War did not distinguish women with different types of sexual harassment, sexual assault, or no such incident. In other words, the women who were assaulted did not report inordinately higher levels of other problems. They weren't "bad apples." If you control for their combat stress, sexual assault during the Gulf predicted their posttraumatic stress disorder symptoms over and above everything else. Furthermore, they had other symptoms as well, such as depression and anxiety. Most interesting to me, in a way, was that not rape, but actual physical harassment, generated psychiatric symptoms in some of the women, not at the level of a rape, but more than verbal harassment or having no such event. The spectrum of events that we are talking about involving women is really not dissimilar to what goes on in the corporate setting in the United States in workplace phenomena.

There are some distinctive aspects not only of rape but of severe forms of sexual harassment in military settings that may distinguish them from single



incidents, or incidents outside of military settings, in that they occur in a seemingly safe environment. It is a combined workplace and lifestyle environment where people spend many hours. The perpetrator is likely to be familiar and is often in a supervisory role. The event is likely to be highly role discrepant. Women in the military have a soldier image. There may be larger social or vocational implications, actual or perceived by the survivor, that may influence his or her decision to report the incident. The survivor's general status remains at the discretion of the institution, even though the event constitutes workplace harassment and assault, which would ordinarily be adjudicated in a U.S. court of law. Lastly, the military setting itself, by the nature of the possibility of frequent stressors or redeployment, always raises the issue of possible re-traumatization or additional daily hassles or recurrent stresses through subsequent activities.

But even if bad things happen, better things can be done. The women and men who suffer sexual assault and go on to develop chronic posttraumatic stress, if they receive appropriate treatment within the first 1-4 weeks after the event, have a very good chance of making an excellent recovery. Trauma symptoms do not go away by submerging them. They usually come back in a worse form. Active reprocessing usually is required to get over a distressing event. In the first 4 weeks, most people develop an acute stress disorder in response to a very bad event. That is something that they often can recover from, if they are given the appropriate treatment, unit support, and leadership support at the time. Some of the reactions that occur are similar to the symptoms of posttraumatic stress disorder. There is often some active element of dissociation or feeling that the event is unreal or is happening outside oneself. That is now seen in some ways to be part of the normal recovery process.

What are some future research suggestions? We can look for people who are at risk for these kinds of acute stress reactions or chronic stress reactions after being exposed to traumatic events. We can look for evaluations of specific childhood experiences that cause a person to develop an at-risk profile. Lastly, we can learn to identify mechanisms of dissociation for people who are not able to engage in a therapeutic process.

We really are looking at quick, rapid interventions with a strong support network and support from the top, where unit and leadership cohesion is seen as not tolerating this kind of behavior and the survivor is not re-traumatized. I want to give credence to the fact that these events can happen to men as well as women, and they have prolonged effects on them as well.

To conclude, traumatic stress exposure can have a pronounced effect on mental and physical health status. Differing forms of trauma appear to account for discrepancies in the rates of traumatic stress that we are seeing in women, with sexual assault contributing the most, and in military women, the rates may be higher for exposure than for civilian women. Other things for women appear to add to the traumatic stress, such as witnessing severe injury. However, the sexual assault incident itself appears to increase the symptom levels dramatically.

Finally, some data suggest that premilitary or childhood events increase the likelihood of adult trauma in the military and in civilian settings and poorer outcomes following exposure. This is something that we see in all kinds of individuals, not just in those in the military. This relationship has been shown for men, but it is most pronounced for women, possibly because rates of childhood sexual abuse in this country are higher for women than for men. We need more prospective longitudinal research to explicate the effects of antecedent events and how they interact with outcomes in men and women, and to find out what we can do in the active-duty setting to facilitate outcomes for individuals.

## EPIDEMIOLOGIC OVERVIEW OF COMMON GYNECOLOGIC DISORDERS AND FIRST-TRIMESTER COMPLICATIONS AMONG ACTIVE-DUTY WOMEN

LTC(P) Carla Hawley-Bowland, MC, USA

I want to present an overview of the common issues facing women in the military both in the field and in deployed status, and to go over some of the issues that have been brought up in the Defense Women's Health Initiative (DWHI). At DWHI we have put aside money and established a database to collect data on women in the military while they were in the field and deployed so that we could better serve our women and develop policies that would maximize their performance in those environments.

Some of the specific issues which were addressed concerned menstrual periods and sanitation and contraception while in the field and during deployment: How do women deal with menstruation in the field? In the past women used to have to take one duffel bag for their gear and one duffel bag for tampons and sanitary pads to survive 6 months in the field because these items weren't available overseas. The sundry packs have now been modified to include those items.

Specific issues to be considered in constituting the sundry packs were the need for ample supplies of regular and super unscented tampons with cardboard rather than plastic applicators. Good hygiene is also facilitated by the availability of extra underwear and of moist towelettes, which are especially important when showers are not readily available.

Some methods of eliminating menstrual periods during deployment are also available. One option is the use of continuous birth control pills. These are used even though the effects of long-term use of continuous regimens have not been studied. Depo-Provera is another option. However, it can be a problem obtaining the medication and continuing the injection schedule in the field. The new technology of endometrial ablation might also be an option for women who are through with childbearing and want to stop menstruation.

There are multiple logistic issues regarding birth control during deployment. One of the main issues for oral contraceptives is that of adequate supplies. For a 6-month deployment, a six-and-a-half-cycle supply is needed, so seven must be given. However, two extra must be given due to the uncertain time period of deployment. If the patient is on a continuous therapy, she needs 8.6 cycles. Thus an adequate supply for a deployment using continuous therapy would be 11 packs of pills.

For Depo-Provera, again, getting the medication out to the field and at the proper time is a problem. One possibility is to dispense the Depo-Provera injectable and the maintenance schedule with the patient when she goes to the field. Then she can have the medic at her battle aid station give her the medication at the proper time.

Norplant is another form of birth control that is available. It is good for 5 years with no required maintenance. Some of the possible and common side effects are irregular and heavy bleeding, especially when first used, which some women are unwilling to endure. We are also considering a new site for insertion—placing it over the rib cage of active duty women. The inner arm is too sensitive as the sleeve hits that spot when rolled up.

Some of the problems of active-duty women in deployment are related to the fact that the equipment, which is designed for men, may not be suitable or ideal for use by women. Gary Davis, when he was at Fort Benning, noticed an increased incidence of stress incontinence in active-duty soldiers who had never been pregnant. On physical exam, he found lateral wall defects which were a result of women jumping out of airplanes and landing on their feet and

actually tearing the lateral support of the pelvic wall. We need to look at whether the services should redesign the harness for the parachute so that the soldier lands in a different position, thus changing the physical forces to prevent detachment of the lateral vaginal walls.

Orthopedic disorders differ between men and women. Men injure their knees frequently. Women injure their ankles more often. One reason for this might be the design of boots for females, which are basically male boots in female sizes. A redesign, perhaps making them like running shoes with the specific dimensions of a woman's foot, might alleviate some of the ankle problems. Heel pain and Achilles tendinitis are also fairly common in women who wear high heels.

Vaginitis increases when tight pants are worn. The battle-dress uniform worn by all the army soldiers has a short crotch. Therefore, women should be encouraged to buy the loose, baggy fit in order to decrease their risk. The shoulders in females are also vulnerable when using standard load-bearing equipment meant to carry weight on the shoulders. Women are more comfortable when carrying weight on the hips. Redesign of this equipment would facilitate load carrying by female soldiers.

Airplane cockpits are designed for the 5 foot 10 inch male. Most women can't reach the buttons or the pedals without back strain. A redesign to create universal cockpit that both genders could use comfortably might solve this problem.

There is no privacy for urination in the middle of the desert and in many other areas of deployment. If women urinate infrequently because of this, they are at an increased risk for distension and bladder infection. Also, if blunt trauma occurs, there is an increased risk of rupture to the bladder because of its distension. By not drinking fluids, women will also undergo intentional dehydration to avoid frequent urination due to the privacy issue. We have been successful in testing a device to address this issue.

At Fort Bliss in a field exercise, we have 30,000 troops roving all over the desert in New Mexico. In one such deployment one woman became dehydrated and required IV hydration in the field, three developed urinary tract infections, and one woman needed catheterization after voluntary urinary retention due to overdistension and the inability to urinate. We decided to look at female urinary diversion devices that allow urination through a trouser fly, without removing clothing or gear. They were first developed by female backpackers. We did a prospective crossover clinical trial of two devices: the Freshette Complete System and the Lady J. We enrolled volunteers among women soldiers who used them in the field and compared them. We did a urine culture prior to deployment and eliminated all those women with urinary tract infections. Then we issued them their first urinary device. Halfway through the exercise they underwent an interview. We got a second urine sample, completed a questionnaire, and then issued the second device for them to try. At the conclusion of the exercise, we got a third sample and completed the second questionnaire. We also used controls, who had an initial urine culture and another culture one week later.

We enrolled 53 women and ended up with 35 testing the devices. The preferred device was the Freshette, because it had a longer spout. When we checked the results, one control had a urinary tract infection, but none of the field testers did. Two controls had to undergo IV hydration for dehydration. No field tester underwent IV hydration.

Finally, for deployment we need to make arrangements to maintain the health of our active-duty female soldiers. Health maintenance appointments, such as Papanicolaou smears and mammograms should be done early rather than late if women are being deployed. Thus even if it is not quite a year, if they are going to be deployed, they need to go ahead and have them done, because they

may be gone for 6 months. If a Papanicolaou smear is abnormal, instead of repeating it, it is better for the patient to have a colposcopy done promptly, check for normalcy, and have treatment if necessary before deployment.

Based on our experience in Desert Storm, one last issue worth mentioning is to consider adding a colposcope to equipment in theater. If they had had one colposcope in theater in Desert Storm, we wouldn't have had to evacuate dozens of patients back to Germany who needed to undergo colposcopy for followup.

## **CONTRACEPTIVE NEEDS, COMPLICATIONS, AND NEW DIRECTIONS FOR RESEARCH**

LTC Dan Gehlbach, MC, USA

It is a curious testimony to our society's degree of sophistication that in the 1990s, we take contraception so much for granted. Those of us who are young enough to need birth control have never really known a time when a variety of contraceptives wasn't available. The birth control pill has been around longer than most of us have been alive. Condoms are much more widely available now than they ever were before, and a female condom has been on the market for several years. The diaphragm is an over-the-counter alternative. The intra-uterine device (IUD), which almost disappeared following the Dalkon Shield debacle, has experienced a resurgence, and its length of usage has recently been extended to 10 years. There are new delivery systems for progestational agents: Depo-Provera, given as a single injection every three months, and Norplant, the set of silastic implants that are inserted beneath the skin of the arm. Both of these agents are as effective as a tubal-ligation procedure.

Given that we now enjoy so many choices, it would be easy to believe that all pregnancies in the United States are well thought out in advance, meticulously planned, and conceived at the opportune time. The sad truth remains, however, that the majority of pregnancies in the United States are still unintended. More than 50 out of every 100 pregnancies are unplanned. Worse, many of these are unwanted, as reflected by our high abortion rates. The limited data available for military women suggest that we are no better than our civilian counterparts at preventing unwanted pregnancies.

It is not difficult to write the specifications for an ideal contraceptive. It should work every time; it should be easy for anyone to use, because almost everyone will need it at some time in their life; it should not be unpleasant or uncomfortable to use; cost is always a consideration when talking about health care; durability is also a consideration for the military. Our profession demands that we be able to travel at a moment's notice to some very inhospitable parts of this planet. With an eye to the future, we don't want to sacrifice our health by using a contraceptive with long-acting adverse metabolic effects. Although we have many choices of contraceptives, we don't have one yet that can meet our specifications for the ideal. All methods have their own sets of limitations, and no one choice is right for everyone.

One of the primary reasons a contraceptive method fails is the occurrence of an associated side effect. Our bodies are all uniquely different from one another. While a chemical agent may pass easily and harmlessly through one of us, the same medication may cause extensive damage in another. For example, oral contraceptives that have a high estrogen content may be tolerated by 999 women, but in the next woman may cause venous thrombosis, pulmonary embolism, and death. People also differ from one another in their ability to tolerate certain physical discomforts. While breakthrough bleeding may be

only a minor nuisance to one woman starting a new birth control pill, the same degree of vaginal bleeding may be completely unacceptable to another.

Side effects are usually the primary reason given for stopping a form of contraception. In addition to the risk of pregnancy when a woman doesn't use a method as intended because of side effects, they may prompt her to seek medical attention. This increases our health care costs and adds further stress upon our already overburdened health care system.

A certain contraceptive may work well in one situation, but fail miserably in another. For example, birth control pills, a method which requires daily use, would not be my first recommendation for a woman who is sexually active on an infrequent basis. Nor would condoms be a good, long-term contraceptive for a pair of young newlyweds. A woman's work schedule can also cause problems. The ability to take a birth control pill daily without fail is made easier when it is linked to some daily ritual, such as preparing for bed or brushing one's teeth. Irregular work hours, overnight assignments as duty officer or on guard patrol, or time spent in the field or on temporary duty all can interrupt normal daily rituals and make it harder to be compliant.

Using a method effectively requires a thorough knowledge of how it works and also when it doesn't work. This is an area where we health professionals are frequently at fault. Our high volume health care delivery system precludes the time that we should be spending on educating our patients about their methods of birth control. Women need to know the common mistakes that can cause the system to fail and what to do when a backup system is needed.

No matter how good a contraceptive is, it won't work if it isn't used. In particular, there are two groups situated at the extremes of reproductive life who are less apt to use contraception. The woman approaching menopause may discontinue contraception because she perceives her chances of becoming pregnant to be very low. Although she is not 100% accurate, in general, her fertility is decreased. On the other hand, one of the most fertile groups, that of women under age 20 who probably need effective contraception the most, are also the ones least likely to use it.

The Persian Gulf conflict revealed a number of weaknesses in our strategy for providing effective contraception to our service members. One study reported a crude pregnancy rate of 2.3%, which was calculated by reviewing the sick call records over a 6-month period of 5 medical units that were supporting an armored division. Recognizing the limitations of such a retrospective chart review, this nonetheless suggests to me that the annual contraceptive failure rate during Desert Storm may easily have been in the range of 5-10%, a number that is clearly too high.

Our policy in that conflict was to immediately evacuate out of theater any service member who was found to be pregnant, which turned out to be a significant expenditure of resources. The number one reason for evacuating women was for the diagnosis of pregnancy. This accounted for more evacuations of women than for all other reasons combined. Let me say that again because I want this point to be crystal clear. The single greatest threat to our women troops during Desert Storm was not land mines, chemical weapons, exotic diseases, or even SCUD missiles. It was pregnancy, something that we can prevent.

Not only did pregnancy keep our evacuation system busy, it also tied up our field hospitals. Complications of pregnancy such as vaginal bleeding, spontaneous abortion, and even ectopic pregnancy, were seen and treated in the field during Desert Storm. Effective contraception would virtually eliminate this source of hospital admissions. Fear of pregnancy was apparently a common concern among our troops because it was the most common gyne-

cological complaint heard at sick call, surpassing such common disorders as vaginitis or menstrual irregularity.

Our system for dispensing contraception for deployment should also be revamped. Many women on oral contraceptives didn't have an adequate supply for their tour of duty. Others were told not to bring them overseas because, unbelievably, they wouldn't be needed. Few brands of birth control pills were available and a number of women had to change brands while they were in the theater. Nor was there any formal system for dispensing condoms, the form of birth control that is also best at reducing the risk of sexually transmitted diseases.

Where do we go from here? Do we throw our hands up in defeat, or do we throw fists full of dollars into research looking for the new ideal contraceptive? Actually, I vote for neither course of action. Rather, as we regroup after the discomforts of downsizing, we need to ensure that all service members have ready access to family planning services. Many small military clinics have closed, and our troops must go elsewhere to receive their gynecologic care. This is one area where relatively small sums of money spent on pregnancy prevention will save the much larger expenditures required to care for these unintended pregnancies. To take that thought one step further, let's work with our troops even before they enter our system to make sure that they are not going to start their career with an unplanned pregnancy. Remembering that most recruits are in the age group at greatest risk for an unintended pregnancy, we may easily get the best return on our health care dollars through active intervention, rather than waiting passively for these soldiers and sailors to access the medical system.

Different forms of contraception should be available throughout the uniformed services, especially for the newer methods, such as Norplant or Depo-Provera. Right now, access to Norplant depends largely on where one lives, because many military clinics don't offer it due to its relatively high start-up cost. We, as health care planners and providers, should decide which systems are appropriate and under what circumstances they should be used, and then make these services available to all service members, no matter where they are stationed. We should also educate our patients on what to do when a condom breaks, when a diaphragm slips, or when unprotected intercourse occurs. Post-coital contraception is one of the best-kept medical secrets. Even many health care providers are unfamiliar with the various methods or how to administer them.

One problem that should be addressed immediately is the contraceptive needs for deployment. We do a good job at vaccinating our troops, helping them fill out wills, arranging family assistance, and briefing them on the environmental, geographical, tactical, and cultural aspects of their upcoming assignment. I would also include a visit to a health care provider to review their current method of birth control and discuss alternatives. Certain questions need to be addressed. Will it be easy to use in the deployed situation? Are there side effects that will be hard to treat in the field? What about the risk of capture and sexual assault? Such an encounter would also give us the opportunity to diagnose an early, unknown pregnancy, should one exist, before we send a soldier or sailor halfway around the globe. If a woman patient wants to start a new contraceptive method, we ought to give her time to institute that change.

During deployment, birth control should be more widely available than it has been previously. Condoms should be easily accessible to both men and women. Those women on oral contraceptives ought to be able to carry their own six- or twelve-month supply, rather than tying up precious sick call time for routine pill refills. Depo-Provera, the single injection that protects against

pregnancy for a minimum of three months, ought to be there with our troops at the field hospital for those who desire it.

There is also a tremendous need for contraceptive research in the military. Although I am skeptical about finding the ideal contraceptive, the military has a rich history of significant research discoveries. Our population presents unique study opportunities that are unmatched in the civilian world.

We need to ensure that our existing contraceptives can withstand the extremes of environment and conditions that our troops are forced to endure. We should seek out new and innovative ways of administering hormonal medications that will provide effective contraception while reducing or eliminating vaginal bleeding. Finally, perhaps the best way to institute these improvements in a coordinated, logical fashion is through the development of a coherent policy that meets the contraceptive needs of our troops today and anticipates the changes necessary to keep the fighting strength what it is today, second to none.

### **DYSFUNCTIONAL UTERINE BLEEDING IN ACTIVE-DUTY WOMEN: SCOPE OF THE PROBLEM AND MANAGEMENT OPTIONS**

LCDR Nancy F. Petit, MC, USN

Dysfunctional uterine bleeding (DUB) is a significant problem in active-duty women. Information pertaining to our most recent military conflict reveals that more than 35,000 women were deployed to the Middle East in support of Operation Desert Storm. These women were exposed to the desert environment and field sanitation for 4–6 months at a time. Several individuals collected data on health care needs during this conflict.

Captain Jeff Hines, while serving as a battalion surgeon for the First Cavalry Division in southern Iraq, reviewed information for more than 10,000 ambulatory medical visits. Although women made up a total of 6% of the division's strength, they accounted for more than 18% of all sick-call visits. Twenty-five percent of all these complaints were gynecologically related, dysfunctional uterine bleeding being the most common.

Major Glen Markinson reviewed all medical cases referred to the Eighth Evacuation Hospital, and found that 25% of all outpatient visits were from women. Nearly one-fifth were gynecologic in nature. A fair number of these pertained to menstrual irregularity, with a greater percentage coming from women not on hormonal contraception than from those who were taking oral contraceptives. Lastly, Colonel John Hanna, while assigned to the 312th evacuation hospital in Saudi Arabia, reviewed the outpatient visits of 10,000 women assigned to the Seventh Corps. Five percent of all sick-call visits were gynecologic in nature, with abnormal bleeding being the second most common complaint.

Thus it is clear that even in a field setting, health care providers caring for active-duty women need to be comfortable with an approach to diagnosis and therapy of this common gynecologic complaint. First, it is important to define abnormal bleeding. Menses normally occur 24–28 days apart with approximately 4–6 days of flow. Normal menses are cyclic and predictable because changes involving the endometrium occur almost simultaneously in all segments of the endometrial cavity. The endometrium is stable structurally, with random breakdown of tissue being a rare event. Normal menses are precipitated by rhythmic vasoconstriction affecting all segments of the endometrium.



Dysfunctional uterine bleeding, on the other hand, is defined as abnormal endometrial shedding that is not attributed to organic disease, pelvic pathology, or pregnancy. As Dr. Gehlbach mentioned earlier, pregnancy was the most common cause for evacuation of our active-duty women out of the combat arena. Potential etiologies of bleeding associated with pregnancy include ectopic pregnancies, abnormalities within an intrauterine pregnancy, either threatened, complete, or incomplete abortion, and, lastly, gestational trophoblastic neoplasia.

Once a pregnancy-associated cause for abnormal bleeding has been ruled out, one is left with a number of hormonal etiologies. Hormonal irregularities can involve any of the sites along the hypothalamic-pituitary-ovarian axis. Malnutrition and excessive exercise may be associated with decreased hypothalamic secretion of GnRH. Abnormalities in the pituitary gland include direct damage to the pituitary as well as the presence of a prolactinoma or other pituitary tumor. The ovary can cause abnormal bleeding because of abnormal hormone production, such as is seen in polycystic ovarian disease. Administration of exogenous hormones, including hormone replacement therapy and oral contraceptives, can also cause abnormal bleeding. In addition, an overactive or an underactive thyroid can cause abnormal bleeding, as can an overactive adrenal gland or congenital adrenal hyperplasia. Abnormal bleeding can be associated with systemic disease or with the use of certain medications.

With all of these diagnostic possibilities, how do we begin to sort out the problem? Initiating an evaluation based on a patient's age is a good place to begin. In the first category, in women who are  $\leq 35$  years of age, the most likely cause is from some type of ovulatory dysfunction. A woman  $>35$  has an increased likelihood of pelvic pathology or systemic disease, and it is recommended that uterine sampling be done to rule out malignant or premalignant lesions.

Any woman who presents with abnormal bleeding should undergo a basic evaluation, to include a good problem-oriented history, a general physical examination and pelvic examination, a Papanicolaou smear, and a pregnancy test. An endometrial biopsy is recommended strongly if endometrial pathology is suspected based on a patient's history, as well as if she is over the age of 35.

Although additional studies may be helpful for assessment of endocrine abnormalities (eg, evaluation of serum prolactin and thyroid stimulating hormone levels), of blood dyscrasias (eg, a platelet count and evaluation of partial thromboplastin time and bleeding time), and an assessment for liver disease (eg, evaluation of aspartate aminotransferase or alanine aminotransferase), these are not always necessary. Additional examinations for pelvic pathology might also include a transvaginal ultrasound, hysteroscopy, dilatation and curettage, or diagnostic laparoscopy.

When trying to determine a rational management plan for dysfunctional uterine bleeding, it is sensible once again to return to age-related concerns. For example, the young active-duty recruit who is exposed to strenuous lifestyle alterations, including significant changes in diet and exercise, is most likely to suffer from anovulatory bleeding. Thus a hormonal intervention is appropriate. However, in the absence of an appropriate clinical response to hormonal therapy, a coagulation disorder, such as Van Willebrand's disease should be ruled out.

The active-duty woman, in her peak reproductive years, will commonly have one to two anovulatory cycles per year, and typically there is no need for a full workup after a single episode of dysfunctional bleeding. If there are more than two irregular cycles, I will begin a full assessment at that time.

Older women may also present with bleeding, either in the perimeno-

pausal period or postmenopausal period. Classically, the perimenopause is associated with either estrogen withdrawal or breakthrough bleeding, most often because of hormone-related problems. In the postmenopausal period, although hormonal problems may be of a concern, one needs to realize that 20% of these patients will also have a premalignant lesion or cancer. It is important to know that both use of hormone replacement therapy and serious pelvic pathology can co-exist.

The choice of appropriate therapy obviously depends on the specific diagnosis as well as the patient's age, reproductive desires and status, and other logistic factors. Progestin therapy is an ideal treatment for anovulatory bleeding. It stabilizes the endometrium and allows for orderly, limited, and synchronous withdrawal bleeding. Some of the medications most commonly used to treat anovulatory bleeding include Provera, 10 mg tablets, one a day for 10 days out of each month. Progesterone in oil can also be used with a dose of 50–100 mg by injection every 4 weeks. And finally, Depo-Provera, mentioned earlier as a contraceptive agent, can also be used to control irregular bleeding, giving an injection every 1–3 months.

Oral contraceptives can also be used successfully to treat dysfunctional uterine bleeding. Most commonly, the low-dose combination monophasic preparations are recommended. These are ideal for anovulatory bleeding when contraception is desired. Depending upon how much the patient actually is bleeding at the time, one may start with one tablet a day or twice a day for up to 7 days. Patients should be told that up to 60% of them will in fact have a heavy flow 2–4 days after stopping therapy. If the problem with abnormal bleeding has been chronic, we generally recommend a 3-month trial of this medication for success.

Estrogen therapy also is used in treatment of abnormal and dysfunctional uterine bleeding. It is ideal for estrogen breakthrough bleeding that commonly is found with anovulation, as well as progesterone breakthrough bleeding, which is found with Depo-Provera and Norplant use. In cases of severe acute bleeding, we admit these patients to the hospital and administer Premarin intravenously, 25 mg, every 4 hours, until the bleeding has stopped. If an oral regimen is preferred, Premarin, 1.25 mg, or Estrace, 2 mg, may be given every 4 hours for 24 hours, followed by one a day every day for 10 days. If the patient presents with less or nonacute bleeding, therapy can begin with lower doses of Premarin on a daily basis for 7–10 days.

Prostaglandin synthetase inhibitors also have been used successfully to treat dysfunctional uterine bleeding. They have been shown to decrease prostaglandin E-2 and prostaglandin F-2 alpha concentrations. They also alter the balance between flavoxin A-2 and the anti-aggregating vasodilation prostaglandin known as PGI-2 and have been shown to decrease excessive bleeding on the order of 40–50%.

Prostaglandin synthetase inhibitors have also been shown to be effective with intrauterine device-associated bleeding. Alternatively, a progesterone-containing intrauterine device can also be used in those women who have very heavy periods. By delivering progesterone directly to the endometrium, it has been shown to decrease menstrual flow on the order of 96% within 12 months.

All of these medications should be readily available to the health care provider caring for active-duty women. Other therapeutic modalities that are available, but only through a tertiary care center, include medications such as GnRH agonists, and surgical options, such as endometrial ablation or, as a last resort, hysterectomy.

In summary, dysfunctional uterine bleeding is a common complaint, and it is therefore appropriate that the health care worker in the field should have the expertise and facilities to deal with it. Although there are many diagnostic

possibilities, most cases may be diagnosed and treated with the use of an age-based approach and relatively simple therapeutic interventions. Current therapeutic modalities based on specific hormonal deficiencies as outlined above should be available to the provider in the field during deployment in order to limit the number of unnecessary evacuations for treatment.

## **IMPACT OF PREGNANCY AND PREGNANCY COMPLICATIONS DURING DEPLOYMENT: THE ROLE OF PREGNANCY SCREENING**

COL Cesar Rosa, MC, USA

I will preface my comments by stating that a military deployment may occur in times of war or in time of peace. For the purpose of this discussion, peacetime deployments, need to be considered and viewed as wartime deployments. When discussing the implications of pregnancy during deployment, consider a female soldier who deploys. Either we know she is pregnant at the time of deployment, or we identify a pregnancy subsequent to the deployment.

My colleagues have reviewed some issues related to pregnancy complications in this meeting. Ectopic pregnancy occurs in roughly 1% of all pregnancies in the United States. When not treated in a timely fashion, it can result in intraperitoneal bleeding and, in the worst-case scenario, death. About one out of every five early pregnancies will result in a spontaneous abortion. If the pregnant service member prior to deployment is documented as having an intrauterine pregnancy with fetal heart activity, the data available suggest that the likelihood of a miscarriage goes from about 18% to somewhere in the neighborhood of 3-5%. Still, the potential for a miscarriage is a reality that we need to deal with, be it in the battlefield or in the field hospital or on the ship out on the high seas.

What about resource requirements? We need to realize that the moment we make a conscious decision to deploy pregnant soldiers and sailors, we need to have the medical staff, the capability, and the equipment to take care of any possible complication that may arise. That means having the resources necessary both to make a diagnosis and to deliver the proper and necessary treatment.

Pregnancy involves the occurrence of multiple signs and symptoms, including fatigue, increase in size and abdominal girth, nausea and vomiting, and musculoskeletal changes. These all may affect the individual service member and, to a greater or lesser extent, may hinder or affect her ability to function in the deployed condition.

In terms of logistic requirements for support, this is a multifold issue. On one hand, if a pregnant woman is deployed, there needs to be appropriate medical personnel available to provide for her care in the deployed area. On the other hand, support considerations need to be made regarding the critical specialty that the deployed service member is filling in her particular unit or her ship, or whatever the situation.

Evacuation of the deployed or pregnant service member from forward areas back to a fixed base facility will create an opening in the unit she leaves. That presents a problem, depending on the critical specialty and depending on the manpower and realities of the deployment.

What about midtrimester complications? These include premature labor and bleeding. Once again, the question is whether, as a system, as a corporation, we want to deploy pregnant women in certain situations. Do we want to deploy our pregnant service members out on ships, knowing that we will

need to deal with the realities of pregnancy? My understanding is that the navy has a policy for allowing pregnant service members to be deployed in certain types of ships, but then returning them back to a fixed base at a certain point during the pregnancy. The dating of that pregnancy and the care of the complications and the realities of those pregnancies prior to the return to the fixed base again remains open. It is a question that I just bring up for discussion. I don't have an answer. I think there will be many opinions.

The bottom line is that as a corporation, we need to make some definitive policy statements. What about societal views? What about society's expectations? We know that the values accorded to life of the pregnant woman and of the fetus are things that are held very high in our society. We know that the expectations are invariably for a perfect outcome, for a perfect baby.

Questions remain regarding how a policy of deployment of pregnant service members fares vis-a-vis what society expects; what can we do for our pregnant population, for our pregnant soldiers in harm's way? We have to deal with some of these issues in terms of females in combat roles, their exposure to capture by an enemy with all the other connotations and situations that implies.

What about predeployment screening for pregnancy? One problem is that screening is not 100% accurate, and early pregnancies still may be missed. What about the legality of screening? Is it legal to subject a soldier to mandatory screening? We screen for HIV and other things. When we say that we will do mandatory pregnancy screening, we are now targeting half the population. There is a certain issue in terms of what is just, what is equal, and what is "politically correct." What about preventing deployment during pregnancy? Is it medically justified? Is there really a good, sound medical reason to say no, it shouldn't be done? Could we not compensate for that fact and for the problems that we already reviewed earlier on? Can we reduce the odds to a bare minimum, to the point that the occurrence of an ectopic pregnancy or a spontaneous abortion out on the high seas or in a forward-deployed situation would be kept at a minimum? What about being socially responsible? I do not know the answers. These are issues that need to be discussed and brought into the equation before a final policy is formulated.

My personal experience during the deployment for Desert Shield was that the number of pregnancies was really noticeable. Couples were facing a separation. They were facing looking the devil in the eye, and it was something that was on many people's minds. Maybe they tried to preserve themselves through a child. We did see a certain blip or a certain increase in pregnancies right at the time of deployment.

Should pregnant service members be exempt from deployment? I cannot answer that. That is for the group and the corporation to answer. Effective contraception might be the best way to answer or to deal with the situation if we are going to say that pregnant servicewomen should not be deployed.

In closing, if the policy was to say "no deployment of pregnant soldiers," should the service member then be held responsible and accountable for not being pregnant? That might be, indeed probably is, unfair, because we would be targeting the female portion in our force for some extra responsibility that we are not holding the male part of the force accountable for. Nevertheless, this is an issue that should be addressed. What if we were to say that we will allow pregnant soldiers to deploy? Are we ready to support the adjustments to the system that would have to take place? Again, will society in general support it? We have seen a lot of changes in our society in the way that we think about long-held beliefs and customs.

My contribution today is to bring up the issue of the pregnancy testing and the relative limitations. We will not be able to identify all pregnancies before deployment. We certainly will be able to reduce them to a minimum.

## Comment by Dr. Poth

Yesterday the issue was brought up by Captain Mariner, who is a naval aviator, that if you are out of flight status for 9 months, you lose your flight pay. So, evidently female aviators do not "become pregnant" until they are 4 or 5 months pregnant, because that way they don't lose their flight pay. They just keep it a secret until then. I also know several female physicians at Walter Reed who were surgeons, who didn't let anyone know they were pregnant until they were 6 months' pregnant, because they didn't want to "catch a lot of flak."

Another issue is that a woman who had the desire to have both a military career and a family might feel that she is being punished for being pregnant. This is true even though we don't consider pregnancy a disease. Many women in all different vocational settings have managed to maintain a work schedule and pregnancy without major loss of productivity or fetuses.

### REPRODUCTIVE HAZARDS: MILITARY POLICY IMPLICATIONS

CDR Gregory R. Moore, MC, USN

I want to talk about what we know about reproductive hazards in the workplace, particularly in the military workplace. It is a problem we have struggled with for a long time. There have been various working groups and policy meetings for as long as I have been in this business, trying to come up with a policy that addresses all of these topics. Unfortunately, they usually give up at some point during the proceedings.

We obviously are trying to ensure maternal well-being as much as we possibly can. We also are trying to ensure fetal health. Maternal health and fetal health are in somewhat different categories. All of us in uniform have signed up to be put in harm's way. Therefore, our country looks at us as different from civilians. Our military command authority looks at us a little bit differently. The fetus, however, has not signed up for this duty, and we have to keep that in mind.

Readiness is the main reason why we have a military. Our ability to conduct warfare and the various other missions that we are given is key to why we are here, why we should be here, and why our country counts on us. It has to be an overriding concern when making any sort of military policy affecting any personnel. Mission completion is what we want to do. We want to be able to take whatever task is given to us and complete it. On the other hand, there are issues of opportunities for the individual. We have heard a few questions about that, about promotion.

The obvious things are probably the things that we are going to see the most and that we need to think about the most, under the general rubric of ergonomics. There is a constantly changing center of gravity, almost on a day-by-day basis, during pregnancy. We know that the work of certain activities, such as lifting, clearly is made much more difficult by the amount of load.

One factor that increases the work of lifting the most is the distance from the axial skeleton. When we look at all the Occupational Safety and Health Administration (OSHA) calculations on determining how much a worker can lift, we find that the distance from the axial skeleton is the most important factor. Obviously, in pregnancy, the distance from the axial skeleton during lifting increases. The difficulties with lifting are further compounded during pregnancy because loss of balance and slipping are more likely to occur as a result of the changing center of gravity.

Fatigue can be a problem, something that all of us who care for women

who are pregnant, realize. There are times when fatigue, sometimes very severe fatigue, occurs, which makes it difficult for a woman to do her mission. This is true whether the woman's mission involves getting up, getting on the Beltway, and getting to work, or being on the flight deck refueling Tomcats.

Lightheadedness, which sometimes occurs during pregnancy, is usually not a big problem. Certainly we don't have any proscriptions about pregnant women driving cars. But although lightheadedness is not an uncommon symptom, in dangerous working environments—and clearly, many, many military working environments are very dangerous—even a little bit of lightheadedness can be a problem.

Overuse injuries, particularly carpal tunnel syndrome, is more common in pregnancy. Therefore, tasks that tend to cause tendinitis are going to result in more injuries during pregnancy.

The effect of shift work is another thing that we are just beginning to understand, and there is growing evidence that shift work, particularly combined with other physical factors, such as prolonged standing and extremes of cold and heat, might increase the incidence of miscarriage.

Nausea and vomiting are common problems in pregnancy. Nausea and vomiting on a destroyer in the north Atlantic would be a problem even for men. If pregnancy increases the severity of those conditions, the readiness of a particular unit potentially could be compromised if pregnant women are on board.

The frequent urination that is common during pregnancy becomes a little bit more of a problem as pregnancy progresses and can be a problem, particularly when a pregnant woman has to be in one particular place for a prolonged period of time—for instance a flight deck or out in the field—and bathroom facilities are not readily available. Because of this, our navy policy regarding flight controllers or air traffic controllers is that pregnant women can continue working to 28 weeks.

This is a different situation than for civilian flight controllers who certainly continue to work further into their pregnancies. However, our flight control towers are sometimes just in little boxes on top of a few telephone poles with a ladder going up and down, and the nearest bathroom may be 5 miles down the road. Just getting up and down that ladder and getting back and forth to the bathroom becomes a problem.

Clearly, there are a lot of emergency situations in a military environment. There are also a lot of emergency situations in a civilian environment. Whenever I get off a commercial airliner, I always look at those little doors over the wing and think, if the first person that is supposed to go out there is about 36 weeks pregnant, none of us may make it.

Respirators are used during a fire. I don't know how many of you have been respirator fitted, but it is a hard process to get a respirator that really seals properly. And once you have it sealed properly, you would like it to stay that way. In pregnancy, because of edema, that fit may change, creating a problem. Another difficulty with respirator use in pregnancy is the increased work of breathing during the pregnancy. Pregnant women process much more air because of their increased respiration than other individuals, and this may be limiting when using a respirator device.

Damage control is a situation that requires absolute peak physical performance. Damage control on a navy ship makes the difference of whether that ship continues to float or not. Everybody involved has to work at peak performance, and this is difficult for everybody involved. But if a woman is pregnant, nauseated, lightheaded, or has any of these kinds of problems, the survivability of that woman, her fellow crew, and that ship may be affected. If abrupt evacuation is required, size and shape clearly would be important. Warships do not have elevators for people, only for airplanes. The way up,

down, and around is via very narrow ladders, very narrow passageways, and slippery decks.

Heavy metal exposure during pregnancy is also an issue. The heavy metal of most concern is lead. It was the first reproductive hazard ever identified in the workplace that resulted in women being removed. This was in the 1700s and 1800s in England in the white lead ceramics industry, where the employers noticed that women were having an increased number of miscarriages. Women were removed from that industry.

We know lead crosses the placenta easily. We are increasingly concerned with determining the safe level of lead in children. It has recently been determined that safe levels near the undetectable range, and we think that a non-detectable level of lead is really what is appropriate in the fetus as well. The other point is that lead lasts for a long time. Bone lead persists for 30 years. During pregnancy, there is a rapid turnover of calcium and a leaching of heavy metals, including lead, out of the bony cortex at a much higher rate.

We know that noise is transmitted through the abdomen very clearly. In fact, some frequencies actually are accentuated. There is virtually no attenuation of sound. We know that in the military there is a lot of high-level sound out there. We use ear protection extensively in the Navy. Hearing protection is a major program in the military. Unfortunately, there is no real way of shielding a fetus from noise.

There is some evidence of hearing loss in children who were exposed to loud noise in utero. Lalande did a study in Montreal in the 1980s with women who worked in municipal garages with buses. City buses are fairly loud. Standing next to a city bus gives an exposure of about 95 decibels, which is within the OSHA standard for hearing protection. The study showed that when children born to women working in those garages were tested at 5 years of age, they demonstrated evidence of hearing loss.

Nonionizing radiation exposure may also be an issue. It is becoming more and more ubiquitous in modern society. It is something we get many questions about in prenatal clinics because it is everywhere. Computers are the source that everyone asks about, but there are many other sources. Heating blankets are probably the worst exposure scenario because they produce a lot of low-frequency radiation very close to the body for long periods of time. The literature is complex and controversial, but exposure and poor pregnancy outcome have been linked, particularly in the Scandinavian literature. However, probably the best study was done by the National Institute of Occupational Safety and Health, the scientific branch of OSHA, which indicated that there was not an increased risk of abortion because of this exposure.

Exposure to solvents is not desirable, even in nonpregnant individuals. One common solvent is toluene. We know that fetal toluene syndrome exists and appears much like fetal alcohol syndrome. The only time it has been described in the literature is in drug abuse situations, in which people are sniffing glue and paint. The threshold might be a limited exposure to solvents in an occupational setting. Menstrual irregularities have been linked and pre-eclampsia has been found to be increased in a very well done study involving women exposed to solvents.

We know heat is teratogenic. Increased core temperature during early pregnancy is linked to neural tube defects. This is seen most frequently as the cause of babies with neural tube defects associated with maternal fever. There are occupational situations, particularly in the military, where exposure to extreme heat is routine. In a conventionally fired boiler in a warship in the Caribbean, it is not unheard of to have the ambient temperature be 130-140° F. The working conditions are mediated by using a system with rapid changes of the personnel, but such exposure still does occur.

The personal protective equipment that we may be using, for example in



chemical warfare and in fire, trap heat. That was a subject discussed during the Persian Gulf conflict, ie, could we actually fight a desert war in this sort of protective equipment. I think everyone agreed that we couldn't fight it for very long.

Air travel presents a variety of potential hazards. The oxygen tension falls dramatically at altitude. Commercial airliners are pressurized to about 6,000 to 8,000 feet. Thus in a passenger airplane PO<sub>2</sub> is in about the 60-65 range. Although fetal hemoglobin is much better at extracting oxygen than adult hemoglobin, there will be a decrement in the amount of oxygen that is available to the fetus in this situation.

In addition, planes are kept very dry. This can lead to dehydration. This may or may not be linked to preterm labor, but it is a potential problem. Pregnancy is a time of increased coagulability. If we had to think of a way we could get someone to have a blood clot, it would be to make them pregnant and make them sit all scrunched up for a long period of time. That is kind of what air travel is.

Radiation is significant at high altitudes. Aircraft are thin-skinned. Flying from New York to Tokyo at the usual altitude of 40,000 feet is equivalent to two chest X-rays. At times of high solar activity, sun spots and solar flares, it is increased by an order of magnitude. An occasional trip is probably not a problem, but with members of an air crew, it may be a problem.

There are many other hazards that could be discussed, but this is a brief overview of some of the relevant issues.

### **PERSONAL EXPERIENCE WITH POLICY AROUND FAMILY ISSUES**

MAJ Beth Ellen Davis, MC, USA

Having been a military dependent for the first 22 years of my life, moving 11 times in a family of six, I had experienced the life of a traditional military family, and wasn't totally naive when accepting an ROTC scholarship for my undergraduate education. I was not, however, prepared for the hasty 6-month deployment of Desert Storm/Desert Shield that left behind a 2-month-old infant, especially because parenthood had already been postponed for 7 years so that I could attend medical school and residency.

With a supportive nonmedical, nonmilitary husband and an extended family that really rose to the occasion, my son had no less than two full-time adults at his beck and call. As a matter of fact, I think that there was some interesting spillover. A couple of days after I returned I saw white shirts hanging on the door. I walked past them a few times and finally asked my husband, "What are these shirts doing here?" He said, "That is where I leave them when your mother has time for ironing." I said, "Wes, the war is over." That is when we both realized how much support we had. Many people in the same situation are not as fortunate.

As a general pediatrician, I have daily contact with active-duty mothers. Some of the mothers are single parents, some are without any family support systems, often involved in frequent moves, or geographically separated to manage dual military spouse assignments. Some care for children with special needs. The role of wife and mother, as seen by the military, has traditionally been one of a supporting structure for the active-duty sponsor. That role is continuing to evolve as the "wife and mother" is now often the same as the active duty sponsor. Evolution requires change and, as a biology major, I know that change can either occur with catastrophic events, or it can occur so slowly as not to even be noticed by a generation. I think both are occurring with this evolution, at the individual level, at the command level, and at the Department of Defense (DOD).

In my experience, and in the experience of the families that I care for, there are many ways that the military health care system has helped active-duty women to successfully combine their military careers with motherhood. One way has been the recognition that the health of the child and health of the working mother are vitally linked. Excellent comprehensive prenatal care, access to that care, and care of dependent infants and children by supportive local commands to accomplish well-child visits and immunizations are health maintenance services proven to show decreased complications, early intervention, and decreased time away from work.

Childhood immunization compliance is an example of a DOD initiative modeled to meet one of the Healthy People 2000 goals developed by the United States Public Health Service. The Healthy People 2000 project set what is, for a nation, a fairly lofty but important goal: that the immunization rate for children under 2 years of age should be 90%. In March of this year, in one of our leading pediatric journals, an assessment of immunization compliance among children in the DOD health care system was published. By age 2, 86% of the almost 2,000 military dependents screened had received the basic 12 immunizations. That research was carried out here at Uniformed Services University of the Health Sciences. Already we are close to meeting this goal.

Another important way that the military and its health care system facilitate the function of active-duty women as wives, mothers, and professionals is through the high quality of the child care facilities that are provided at military sites in close proximity to the working mother. Many of these care providers are also able to accommodate children with special needs. I have been extremely impressed by the close association that these child care facilities maintain with health care providers and with the high quality of standards that the facilities maintain.

Community support systems are prevalent in the military, including international networks that are available to military families, such as the National Military Families Association, which is based in Alexandria, Virginia. They are able to actually reach families, working mothers, and stranded civilian spouses of working mothers in all parts of the world through the Internet. I would be remiss without mentioning the Exceptional Family Member Program which recognizes families with special health care needs and finds services within the military to match those needs.

In my opinion, there is still more to accomplish by resolving the conflict of the active duty woman's two identities: one in the military and the other in the home. It is difficult to try to separate the "soldier first" mentality from a mother who has a sick child at home and was up all night with that child. These two primary identities coexist in the same person and sometimes conflict. My impression is that there may be a continued command expectation that "someone" is still going to fulfill the role of traditional wife and mother, even though the female in the relationship is not at home and may be a single active-duty parent.

Some of the ways that the women have responded to the dichotomy are by having fewer children, having their first child later in life, or waiting longer between children. Yet, working women retain the major burden of child care responsibilities. Full-time homemakers spend an average of 6 hours a day in child care, compared to full-time "out of home" working mothers, who add to their day an average of 4 hours in the same role. What that means is that they have less time for leisure, less time for continuing education, less time for themselves, and less social time. There is a lot of rationalization that occurs personally to accommodate the professional career development of military women.

There are several issues expressed by active-duty mothers that I find myself listening to as I do well-baby visits and work in the pediatric clinics. The

first would be maternal sleep deprivation, which I think is a problem for many parents. It is difficult to be an effective worker and parent when extremely sleep deprived. The second is centered around the difficulty and anxiety of arranging child care and making child care decisions. This seems to be especially acute when the child is 4 to 5 weeks of age, and it is time to make that decision before going back to work when the baby is 6 weeks of age. The anxiety and guilt over child care often escalates when families are required to find child care for more than 40 hours a week. Third, the issue of breast feeding comes up a lot, often because of the need or requirement to relinquish breast feeding as a result of deployment or field exercises. There is often guilt and sometimes anger associated with it. And last, is the issue of perceived lack of support or lack of flexibility within the system. I am not sure whether it is because active-duty women are being refused support by their employers or coworkers, or whether they are afraid to ask, but they often view the military as a rigid and completely inflexible environment. Whenever possible, I think military women should be offered flexibility so that they can manage their priorities.

I am inspired by the efficiency, the optimism, the humor, and the perfectionism that I encounter in military women. I think that they must be nurtured so that their evolution can continue uninterrupted.

## **PERSPECTIVES ON NUTRITIONAL ISSUES OF MILITARY WOMEN**

LTC Nancy King, PhD, RD  
SP, USA

One of my projects in 1991 at the United States Army Research Institute of Environmental Medicine was to determine how well military rations meet the nutritional requirements of military women. Surveying the literature, I found that only a small number of women had participated in military nutritional surveys, and that there had not been a survey specifically designed to assess how the military rations address the requirements of the military women.

Between 1980 and 1990, there were only 229 female soldiers who participated in five military nutritional surveys which included soldiers of both genders. Then, in 1993, the first study designed specifically to determine the nutritional intake of female soldiers was done in Fort Jackson, South Carolina.

The data I will present come from these six studies. Each study was conducted in a different setting with different military rations and different data-collection methods. I will describe each study to illustrate the source of the data. I will then summarize the results of these studies, comparing the women's mean nutritional intake with their military recommended dietary allowance, the MRDA. The MRDAs are established jointly by all military services in concurrence with the Food and Nutrition Board of the National Research Council.

The 1980 West Point study (principal investigator M. J. Kretsch) was a 5-day dining-hall study. Of 190 officer candidates that participated, 54 were women with a mean age of 20 years. The ration used in this study was the A-Ration, which consists of perishable foods prepared just as in a regular cafeteria or restaurant operation. This ration is used when cooking and refrigeration is available, and it is served in group feeding. All the dining hall studies that I reported served A-Rations. The data-collection methods used in West Point in 1980 were food diaries and interviews.

The 1985 Hawaii study (principal investigator D. Schnakenberg) was a 44-day field study. Of 240 participants, 40 were women with a mean age of 23

years. The rations used were three Meal, Ready-to-Eat, or MREs, for the first 3 days, and one Tray Pack and two MREs from day four through 44. The MRE is an individual packed meal used when the mission and tactical scenario do not permit group feeding. The components of the ration are processed in pouches. The soldiers in this study received one MRE each for breakfast, lunch, and dinner during the first 3 days of the study. The Tray Pack or T-Ration is used when neither cooking nor refrigeration is possible. The components of the T-Ration are thermally processed, shelf-stable foods packaged in sealed half-size steam table containers (cans). The ration is ready to heat and serve. It is used in group settings. From day four through 44 in this study, the soldiers received one T-Ration for lunch, while continuing to receive one MRE for breakfast and one MRE for dinner. The data collection method for the MREs was diet logs, in which the soldiers indicated the amount of the ration component that they ate. The data-collection method for the T-Rations was the visual estimation method, in which the soldier presents her tray to the data collector before and after eating, and the data collector records the kind and amount of foods on the tray using preweighed food standards as models.

The 1988 Fort Jackson study (principal investigator R. Rose) was a 7-day, nonconsecutive dining-hall study of 81 basic trainees. Forty were women, with a mean age of 20 years. The ration here was also A-Ration, with the use of some MREs during a field-training exercise. The data-collection methods were visual estimation for the A-Ration and diet logs for the MREs.

The 1990 West Point study (principal investigator M. Klicka) was a 7-day dining-hall study. There were 205 officer candidates that participated; 86 were women with a mean age of 20 years. The ration used was A-Ration, and the data-collection methods were food records and interviews, as in the earlier West Point study.

The Bolivia study (principal investigator J. S. A. Edwards) was an altitude study that took place almost 11,000 feet above sea level. This was a 15-day field study. There were 80 participants, 13 of whom were women, with a mean age of 24 years. Most of them were medical personnel and engineers. The rations in this study were B-Ration for breakfast and dinner and MRE for lunch, together with a carbohydrate supplement. The carbohydrate supplement was given because one of the objectives of the study was to assess the effectiveness of the high-carbohydrate supplemental pack in performance at altitude. Although some of the soldiers in this study received the carbohydrate supplement and some didn't, all of the female soldiers that participated in the study received this carbohydrate supplement. The B-Ration is used when cooking but no refrigeration equipment is available. Its components are mostly canned and dehydrated foods, and the B-Ration is prepared centrally by the cooks and served in group situations. The data collection method was visual estimation for the B-Ration and diet logs for the MREs.

The 1993 Fort Jackson study (principal investigator K. Westphal) was the first study designed specifically to assess the nutritional intake of female soldiers. This study was part of a larger study in which data were collected on 158 female soldiers who were participating in an 8-week basic-training course. The nutrient data were collected (principal investigator N. King) over 7 days at the beginning of their training, and there were 49 women that participated. The mean age was 21 years. The ration served was A-Ration, and the data collection method was visual estimation.

The most significant deficits were seen in the field studies. In the field studies, the energy intake did not satisfy the MRDAs of 2,000–8,000 kcal. The field studies also showed that the intake did not meet the recommended protein requirement of 80 g per day. In the two field studies and in one of the dining-hall studies, the dietary intake did not meet the recommendation of 800–1,200 mg of calcium. In the two field studies and in two of the dining-hall

studies the requirement for 18 mg of iron per day was not met. In two of the three studies in which vitamin B6 was reported, the investigators found that the 2 mg daily requirement was not met, and three of four studies in which folic acid intake was reported revealed that the 400 µg requirement was not met.

In the 1993 Fort Jackson study, we found that many soldiers had intakes of <70% of the MRDA for selected nutrients. This is particularly true for calcium: 31 out of 49 soldiers had an intake of calcium less than 70% of the MRDA. The nutritional analysis of the menu indicated that the nutritional content was adequate for all nutrients. However, in examining the actual intakes of nutrients, we found that in addition to calcium, intakes of vitamin B6, folic acid, magnesium, iron, and zinc were deficient.

The two main reasons given in the 1993 Fort Jackson study for not eating more were not being hungry and being too full, suggesting that females may not be able to eat as much as they require to meet the requirements. Other factors such as field conditions, extreme environments like the high altitude in Bolivia, the stress of training, and/or the type of military rations served may also have an impact on the intake of female personnel.

The energy intake in the dining-hall studies was adequate, which suggests that the nutrient density of the menu, that is the amount of nutrient per 1,000 kcal, played a significant role on the low nutrient intakes. The nutrient density in some of the rations used in the field also is low when considering the nutritional requirements of women. The T-Ration and the MRE are deficient in calcium, magnesium, and iron, and the T-Ration is low in vitamin B6. While the actual combinations of rations received in the field will vary, in many cases when consuming these rations, the female soldier would have to consume much more energy than she requires to be able to meet the requirement of these nutrients.

The low nutrient intakes reported in the field studies are similar to the intakes reported in national surveys of the U.S. general female population age 20–29. This suggests that the nutritional problems encountered by military women in the field may not be different from those faced by their civilian counterparts. However, the nutritional problem of military women may be exacerbated by the physical performance demands imposed by military training and by the need to meet energy by height and body fat standards. To comply with the weight standards, food intake often is restricted voluntarily, potentially endangering the nutritional status and possibly having a negative impact on performance.

Most military women will not consume enough food, especially in the field situation, to meet their calcium, iron, vitamin B6, and folic acid requirements. Although the impact of sporadic low nutrient intakes during a 10–14 day field-training exercise may be of no consequence, this may not be the case when this intake occurs routinely or for extended periods, during military conflicts. It appears that the potential for nutritional deficiencies among military women exists, and further research is needed.

Because military personnel pick and choose the meal components they eat based on their food preferences, nutritional surveys of actual food consumption are crucial to determine the food intake and to assess the nutritional status of women. Serving an adequate menu does not necessarily mean that an adequate diet is consumed.

Nutrition education is important to motivate military personnel and their families to select diets and adopt eating habits consistent with the current knowledge relative to healthy eating practices. The implementation of nutrition education programs tailored to military women is crucial. The program needs to feature the importance of eating nutritionally balanced and varied types of food, emphasizing the relevance of dietary calcium, iron, and folic acid

on female health. The program has to have easy how-to guidelines to assist military women in the selection of low-fat, nutrient-rich foods.

More research is needed to ascertain the short- and long-term effects of this sporadic and routine suboptimal intake on the nutritional status, health, and performance of military women. Considering that approximately 54% of the women in the U.S. Army are older than 25 years of age, particular emphasis should be given to including older military women in future studies.

## **NUTRITION AND HEALTH IN MILITARY WOMEN: A LIFELONG ISSUE**

Bernadette Marriott, MD

As I address aspects of nutrition that are particularly important for military women, the views that I want to present are based on activities of the Committee on Military Nutrition Research of the Food and Nutrition Board at the National Academy of Sciences, as well as current National Institutes of Health (NIH) activities in which I am involved. Background materials include a report by the Institute of Medicine (IOM) that formed the basis for this forum, "Recommendations for Research on the Health of Military Women," reports of the IOM Committee on Military Nutrition, and various journal publications.

There are 350,000 women who are in the military, including those on active duty and reservists. Of these, almost 50% are less than 25 years of age. There is a relatively small proportion (about 5.6%) that are over 40 years of age. These data on age refer only to active-duty women. I wasn't able to find comparable figures on women in the reserves.

In addition to these active-duty women, there are increasing numbers of women who are veterans. At the present time, 4% of living veterans are women, but the number of women veterans will increase to 17% by the year 2000. Six hundred and thirteen thousand women veterans were in the labor force in the 1990 census, and in 1994 alone, 36,000 women left active duty in the services. Thus, when we consider the health of women in the military, we can no longer just think about women in a certain age group. We need to think about women across the life span because the activities, diet, and stressors that women face during active-duty life are going to have a strong impact on their health when they leave the military.

One of the major recommendations from the IOM report was for research to be conducted on the nutritional status of women in the military, and that information collected should include information relevant to life cycle stage, military status, and job category. This report also recommended the study of acceptability of rations, of other factors that influence the consumption of field rations and fluids, and research on nutrient and food requirements for optimum performance. Some of these recommendations for research have been moved forward, both within the military and through extramural funding programs.

Recently the Committee on Military Nutrition Research at the IOM was asked by the Army to review studies on iron status of military women that had been conducted by the Army. In this report, which was published in 1995 after reviewing the studies, the Committee on Military Nutrition recommended a specific research program that would include intervention studies, on women in basic training to identify potential specific cognitive and physical performance deficits due to iron deficiency. As Dr. King showed in her presentation, there appear to be dietary deficits of iron in military women, but the real



question remains as to whether these dietary deficits are actually causing performance deficits in the field.

Detailed analysis of the existing data using several different models of iron deficiency is confusing. Much of the reason for this confusion is the use of varying definitions of iron deficiency by researchers. Several models of iron deficiency have been developed in relation to the National Health and Nutrition Survey-III (NHANES-III), and the IOM study recommended that the existing data be reviewed again in detail in the context of these models. They also recommended that a program be developed to address iron status in military women during different phases of their career, not just in basic training, and to periodically screen for iron deficiency. These recommendations were made in December of 1995. Hopefully, this report will lead to some specific research endeavors involving iron deficiency within the Army and the other branches of the service in the near future.

I would like to focus the rest of my presentation on calcium. In her presentation, Dr. Manore reported that civilian women 18 to 30 years of age had average calcium intakes of 787 mg of calcium per day, which is only 42% of the recommended dietary allowance (RDA). Dr. King noted calcium was one of the problem areas that kept showing up again and again in terms of the dietary intake of military women.

We know that 91% of the calcium in bone has been acquired by the age of 17, and 97% has been acquired by the age of 26. Because 50% of military women are less than 30 years of age, the majority of women in the military today are still in this critical age of building their lifetime bone mass.

The determinants of bone mass are both endogenous, (80%, composed of genetic and hormonal factors), and exogenous or environmental (about 20%, mainly nutrition and exercise). Variations in calcium nutrition during adolescence account for 5%–10% of the difference in peak adult bone mass. While this doesn't seem like very much, this small difference contributes more than 50% to the hip fracture rate in later life. Thus, while we are talking about what sounds like a relatively small factor, we are really talking about a major effect in terms of health care costs and, of course, a highly significant cost to the well-being of women later in life.

There are many factors which interact to influence calcium balance, either by decreasing the absorption of calcium from diet or by increasing the excretion of calcium in the urine. One of the substances often mentioned is caffeine. However, caffeine has a relatively small effect on calcium balance. One cup of freshly brewed coffee equals a decrease in calcium balance of only about 2 to 3 mg. This effect can easily be offset by 1 to 2 tablespoons of milk. So caffeine is not as bad a player, as we once thought it was, in terms of women's lifetime calcium and bone health.

Aluminum in the form of antacids can, however, have a very significant effect. Aluminum in antacid tablets can elevate urine calcium by 50 mg a day in people that are taking antacids on a regular basis. During times of stress, women in particular often become chronic users of antacid tablets. A better choice for these women may be antacids which do not contain aluminum.

Fiber has a variable, but mostly relatively small effect on calcium absorption. Wheat bran reduces calcium absorption, phytate in beans can also reduce absorption of the calcium from beans, and oxalate in spinach and rhubarb make the calcium in these two foods practically unavailable. Previously, phosphorus was considered a major player in terms of overall calcium nutrition, but it now is believed to be a less important factor.

Vitamin D enhances the intestinal efficiency in absorbing calcium, with a deficiency resulting in decreased absorption and even transient hypocalcemia. The recommended dose of vitamin D is 200 to 600 IU daily. Five to 10 minutes of sun exposure is sufficient for most healthy adults to have an effective level



of Vitamin D, in terms of Vitamin D and calcium interactions. It is now recommended that the elderly, who are at risk for Vitamin D deficiency, consider having a period of 5 minutes per day of sun exposure before applying sun block. It is hypothesized (from a recent study at the National Institutes of Health) that this would raise their level of vitamin D sufficiently to help bring them back into balance.

Both protein and sodium increase urinary calcium loss across the range of intakes. This is a major concern for military women. In 1994, Robert Heaney stated that differences in protein and sodium intakes from one nation to another are part of the explanation for different calcium requirements based in studies in Europe versus America. At low calcium and protein intakes, the calcium requirement for women may be as little as 450 mg per day, whereas when intakes of protein and sodium are very high, they may require as much as 2,000 mg per day.

In addition to the effects of calcium on bone density, calcium also has effects on other health risk factors. The leading cause of death among women is cardiovascular disease, the cause of 44% of deaths. Cancer was a poor second, and all others combined caused 19%. Influenza was implicated in only 4%, and pulmonary disease, accidents, and diabetes were all in the range of 3%-4%. Cardiovascular disease is, by far, the leading cause of death in women.

At a recent calcium consensus conference, evidence was presented which strongly suggested a beneficial effect for dietary calcium in the prevention of hypertension, which is a major risk factor for cardiovascular disease in women. This is a conclusion that is consistent with those reached by the Joint National Committees on Hypertension in 1984, 1988, and 1993. Not only are we seeing that calcium plays an important role in bone health, but it also may be important in terms of survival in cardiovascular disease.

In spite of the acknowledged importance of calcium, the data on calcium consumption in women are not reassuring. Data from the NHANES-III suggest that a large percentage of the U.S. population are not obtaining the RDA for calcium. Mean daily calcium intake decreased from 907 mg to 728 mg in military women in the studies that Dr. King presented. It is discouraging that both of these numbers are less than the RDA, and the situation appears to be worsening. Thus, deficient calcium intake in women is a problem in both the military and civilian populations.

Sodium intake is also linked to calcium excretion, so it is important to examine the data on sodium intake. Again, in the NHANES-III, mean sodium intakes in women exceeded the maximum recommended daily intake of 2,400 mg. This was particularly true when looking at the sodium intake in women in late adolescence and young adulthood, the ages of the bulk of military women.

Protein intake also interacts with calcium with increased protein in the diet, increasing urinary calcium excretion. In the NHANES-III, mean protein intakes of women in the U.S. were similar across race and ethnic groups, with average daily intakes of 63 to 66 g. This compares to the RDA of 50 g. Mean protein intake declined in military women in basic training from 96 to 82 g; still, it is 102% of the military RDA (MRDA) and 164% of the RDA. Therefore, protein intake, which can lead to urinary loss of calcium, is also very high in military women.

The relationship between calcium and exercise is complex. In a meeting 2 weeks ago at the National Institutes of Health to look at dietary supplements, nutrients, and physical activity, Connie Weaver presented an overview of the calcium issue in terms of exercise. What she reported was that the data are not very clear, and many of the studies are contradictory. As an example, one positive study was an 8-month weight-training study, which looked at weight training or jogging in premenopausal women. The scientists saw a positive effect of these two training exercises on calcium balance and bone accretion.

Similarly, in one other study, there was a positive effect on bone mineral density from 18 months of resistance training in 56 women. Again, these women were in the younger age group and were ingesting a relatively high level of calcium of 1500 mg per day. However, many of the other studies have not been as conclusive and many specific questions remain to be answered.

I would like to finish with the question of the MRDAs and the RDAs. The Committee on Military and Nutrition Research was asked to review the MRDAs in relation to the RDAs. One of their major recommendations was that the services review whether there continues to be a need to maintain separate MRDAs. They specifically raised the question of whether the higher levels in the MRDAs, particularly for protein, are necessary for the military in general and specifically for military women. The MRDAs also assume additional energy requirements for military women and for environmental extremes.

Thus, the MRDAs assume that military personnel differ significantly from the American population in terms of age, fitness, body composition, and activity. The Committee on Military Nutrition Research at the IOM questioned whether the military population in the 1990s really does vary significantly from the American population in ways that would not be addressed within the framework of the dietary guidelines and within the revised RDAs. They recommended that the military look carefully at the MRDAs as a standard by which to measure their foods, their rations, and the performance of their soldiers.

In summary, many important questions remain to be researched on nutrition of women, particularly in the area of calcium. Research of interacting factors, such as protein, sodium, and activity could be conducted using the women in the American military population as a good model for young women and young active women. If such research could be initiated, we would be able to further understand these very complex processes having life span health implications not only for veterans but also for all women.

## **EXERCISE, CONDITIONING, AND FITNESS AS IT RELATES TO INJURY IN ACTIVE-DUTY WOMEN**

CDR Joseph Moore, MC, USN

In addressing the question of musculoskeletal injury in the active-duty female, it is important to look not only at the injury rates in females, which are higher than they are in males, but also at the types of injuries that occur. There are clearly factors that put the female at risk for injury, not only extrinsic factors—those environmental factors that we can sometimes control—but also intrinsic and behavioral factors that contribute to injury. This review offers suggestions on how we might make improvements in each of these areas.

There are several components involved in the concept of physical fitness. The single component that correlates best with injury is that of cardiorespiratory or cardiovascular fitness. There is a direct negative correlation between the level of cardiovascular fitness that an individual has when entering the training environment and his or her risk of injury.

The other areas which are standard components of physical fitness include: flexibility, strength, endurance, and agility. However, an important and neglected focus of fitness is the ability to perform all of the specific activities needed for one's daily job. This is an area of fitness that hasn't been researched much either in the civilian sector or in the military. For example, when one considers the elite athlete, the issue is getting that person back to a specific activity. If he or she is a sprinter, we must get him or her out of the blocks. That

is one of the important activities they have to do. Not only do they have to run and regain their strength and flexibility, but they must also get that power specific timing back. Similarly, if an active-duty member's job is turning a wrench, then we should work toward strength and flexibility exercises that allow her to perform that function without pain.

Thus, perhaps one needs to think about the specific jobs that the active-duty female does in the performance of her duties, rather than how much or how little strength she has compared to a male, or her injury rate when performing some other maneuver. That is an important component of fitness that should be looked at in the future. It represents the real impact of fitness on the day-to-day activities of the active-duty female.

One area that hasn't been well studied is that of lost training days. While there is much literature on the incidence of injury, there are not a lot of data on how long the person took to return to his or her duty. There are also no good comparisons between how long it takes a male versus a female to return to duty after treatment for similar injuries.

As we consider the effects of injury during training, attrition is a significant attention getter. Now that the baby boom has passed through, the attrition rates that we have had in the past in training often can't be tolerated. High rates of attrition in training programs may impact significantly on the careers of officers who run those programs.

Reported rates of injury during training cover a broad range, varying from a low incidence of 16% up to approximately 70%. There are several factors, in addition to the training itself and the initial condition of the recruits being trained, that contribute to this wide range. One factor is how the injuries are counted. If only the stress fractures that come into the hospital for treatment were reported, for example, the incidence rate would be much lower than that which actually occurs in the field. If the criteria for diagnosis of a certain injury is different between studies, there will obviously be variations in the incidence for those types of injuries.

There are several broad categories of injury seen in training programs. The most common type of injury is the overuse injury. Stress fractures are included in this category. Overuse injuries account for approximately 80% of all injuries. Among the rest, acute or traumatic injuries account for about 15% to 18%, and then others—wounds, cellulitis, etc—account for the remaining musculoskeletal injuries. What this says for our training programs is that basically we are doing a good job, that the training is safe, that very few people have catastrophic career-ending injuries. Most of the injuries that result in attrition as well as most injuries that result in light duty and limited duty are overuse injuries.

Let's look at some specifics. Data from the Army collected in the 1980s were reported in the 1990s by Jones. These data showed that muscle strain accounted for the highest proportion of injury type. That was followed by a high incidence of stress fracture, with sprains, tendinitis, and knee overuse injury accounting for most of the others.

If we look at Navy and Marine Corps data, it shows that the SEAL program and the SEAL candidate program at Coronado (both programs are entirely male), have an injury rate of about 30%. Males at the Marine Corps Recruit Depot-San Diego (MCRD) report about a 25% injury rate.

All the training for the Marine Corps female enlisted personnel occurs at MCRD-Parris Island. There is a tremendous spike in the data there, with about 60% of women reporting with an injury during basic enlisted Marine Corps training, while males report about the same rate as in other marine programs, about 25%.

Naval training is a little less intense, particularly for the lower extremity. There is a lot less marching and therefore a lot less lower extremity trauma. About 11% of males will report with injury in naval basic training with about

twice that percentage for females. In Officer Candidate School at Quantico, there are various courses that generally are taken in the summer between semesters at college. There is little time to recover from injury. Thus, these training evaluations report both a significant rate of attrition and injury. The men's injury rate at Officer Candidate School-Quantico is about 23%; the women's injury rate is about 33%.

There are also interesting data on differences between the types of injuries occurring in males and females. For example, there are recent data from Recruit Training Center, Naval Training Center, Great Lakes. In males, the most common injury reported was tendinitis or bursitis about the knee, followed by back pain, shin splints, patella-femoral pain, ie, pain about the anterior part of the knee, ankle sprains, and wrist and shoulder pain. There was a fairly low rate of stress fractures in males.

At the same time in the same training environment the female population had vastly different diagnoses. Plantar fasciitis led the list of diagnoses. This condition results from tightness of the thick fibrous band of the sole of the foot. It is a flexibility problem, not a significant one reported in the male population, but the number one diagnosis in the female population. Could this be the result of the type of shoes women wear prior to enlistment? Do women's feet adapt more poorly to the boot as a result? This is an untouched area of research.

Other common diagnoses in females included metatarsalgia—that is bone pain or generalized foot pain, and capsulitis of the ankle. I have only diagnosed capsulitis of the ankle three or four times in the past 5 years at Camp Pendleton, and I don't know why this reported diagnosis is so high. I suspect that it is probably a misdiagnosis, that a lot of this is probably tendinitis around the ankle rather than capsulitis.

This example leads to the conclusion that proper diagnosis is very important. For example, a diagnosis of capsulitis in my opinion is a long-term inflammatory condition that will probably cause the recruit to at least roll back in training, be treated with nonsteroidal anti-inflammatory agents, be engaged in some form of limited duty for a longer period of time, or be an attrition statistic. Tendinitis, on the other hand, can be rehabilitated more easily and is treated very differently. Therefore, it is important for the clinician to correctly diagnose the condition so that treatment and prognosis may be assigned.

Shin splints, tendinitis, bursitis, and ankle sprains are also relatively common, but stress fractures are higher in females during training. It is interesting to note that while there was almost no back pain reported in the female recruits at NTC Great Lakes, the number two diagnosis in men was back pain.

When musculoskeletal injury has been diagnosed, there are several options. The individual may be assigned to some form of light or "limited duty;" alternatively he may have to be operated on, or may have an injury where a disposition cannot be reconciled until the medical condition has been cleared by a specialist. These last options imply a longer-term condition. There have been very few studies on how long a person placed on limited or light-duty status remains on this duty status. This is changing and there are now ongoing programs examining this. In one study, at least a third of women in training will lose one or more days to injury and will be assigned a light-duty status.

If an injury occurs in an early phase of the training cycle, and the individual wishes to remain, with the approval of the staff the person can just wait until the next training cycle, and go through training again from the beginning. However, many people in later parts of the cycle don't wish to retrain. The final option after injury is that one can leave the program entirely.

Attrition rates are high in some programs. The attrition rate last year for women Marine candidates at Quantico was upwards of 44%. Some of the reasons are type of injury, frequency of injury, and a very short window for recovery after injury due to the intensity of the program. If someone is out 2 to

3 days, it is almost certain that they will be unable to keep up with the pace and have to discontinue the program.

Stress fractures are a "showstopper," and prevent one from training. If left untreated, the condition will invariably become worse and eventually may lead to a true fracture. Stress fractures are more of a problem for women than for men. In various studies in the military training environment, the relative risk of a stress fracture for a female ranges from 1.6 to 5.8.

There is also an ethnic difference in the rate of stress fractures: white females are at higher risk than African-American females and white males, whereas African-American males are at a lower risk. The rates published range anywhere from 0.4% to upwards of 8% or even 12%. The variability may actually be a reflection on the training that is going on and consequently the injury rate that is occurring, or it may be a reflection on the criteria for diagnosis.

Stress fractures are diagnoses that should be made clinically. If these diagnoses are made by X-ray, half of them will be missed. If a person comes in with leg or shin pain and an X-ray is taken, 50% of the time the X-ray will read normal even in the presence of a stress factor. These diagnoses can also be made by bone scan, which is sensitive for stress fractures. They will essentially always read positive when a stress fracture is present. However, when we did bone scan studies at MCRD in San Diego, we found that a lot of the young trainees had increased uptake on bone scan in areas with absolutely no symptoms. Thus, although the bone scan is very sensitive, it must also be correlated with clinical findings.

Stress fractures were first described in the foot (the metatarsal stress fracture). However, now they are identified mostly around the proximal tibia. If a fracture occurs in the femur, especially the femoral neck, that could end a person's career, resulting in surgery to have a pin or a plate inserted. Women in the military as well as female cross-country runners in the civilian population are suffering a greater number of pelvic stress fractures.

Stress fractures are treated differently in the civilian sector than in the military partly because in the military if an individual is sent back to "light duty" without a cast, and it is not understood that there is a stress fracture. He or she may not be allowed to rest the injured leg. In the civilian sector, an air cast is used on a tibial stress fracture, allowing the person to resume reasonable activity, while the bone is healing.

The comfort level of the medical officer treating the injury plays an important role. If the medical officer is not comfortable making the diagnosis clinically, he or she may inappropriately send the patient to radiology, or even refer them to an orthopedic surgeon, causing loss of valuable training time: getting on the bus, going to the hospital, getting scheduled for a bone scan, returning at a later date, and going to an orthopedic clinic. Lost time and inconvenience can be eliminated if a clinician with training in musculoskeletal medicine makes the diagnosis.

There are also known differences (both intrinsic and extrinsic) in risk factors between men and women for other injuries. We can control for some of the extrinsic risk factors, but not for all of them. Those include the load carriage, how much weight is placed on the body, and where. We may not be able to easily control the amount of weight carried, but we may be able to vary how it is carried. There are also errors in training techniques. We are improving at this, but are not perfect yet.

Intrinsic factors are factors related to the human body itself, its anatomical makeup. For example, the angle between the femur and the tibia in the male is basically zero. In the female, there is some angulation of the femur relative to the tibia, and this alignment will cause an increased incidence of patella-femoral syndrome, or abnormal tracking of the kneecap.

Body composition is an important factor in injury. The heaviest and thinnest are at a higher risk for injury. Some studies indicate that the least flexible and the most flexible of us are at higher risk for injury. More data must be collected to determine whether or not they are independent risk factors, or whether they relate to conditioning.

Cardiorespiratory fitness is the strongest risk factor for injury. If recruits were tested immediately upon arrival at training with a 1-mile run time, those in the slowest categories would have a higher incidence of injury in their training than those who were faster.

Traditionally, when we think of fitness, we envision pushups, situps, flexed arm hangs, and other related exercises as a measure of muscular strength. Testing for these components yield very poor results or no correlation with risk for injury. A dynamic lift weight test has a weak association. Load carriage for time, where a run carrying a 40-pound weight is timed, showed that those who were faster had less of an injury pattern. But all of these tests for physical fitness usually have no correlation in terms of injury rate.

This is a major area for research, especially in the female population. Looking at the number of situps or the number of pushups that can be done has no correlation with whether or not there will be an injury in training. It also has no correlation with whether or not an individual can do the job. We need to look more at the work product, what is done on the job, daily life in the military, the individual's specialty, and the adaptability function. These data should help determine the appropriateness of an individual's assignment.

Smoking is a significant independent risk factor for being injured while training. Take bone-healing rates as an example. A stress fracture is simply the body's inability to keep up with the bony breakdown that occurs naturally when it is subjected to stress, versus its ability to heal. Smoking significantly retards bone healing. There is a dose response curve for alcohol consumption and risk of injury. The incidence of injury during training increases, correlating with the amount of alcohol that the individual consumes.

There are racial differences in terms of stress fractures. There is no difference ethnically in the total incidence of injury across the board during training, with the exception of the incidence of stress fractures.

The relation of menstrual history to injury risk is complicated. However, if one simply considers the number of menstrual periods that a woman has per year, there is a correlation. If a woman has fewer than 10 periods per year, she is at a higher risk statistically for musculoskeletal injury.

There are opportunities to improve in all of these areas. Specifically, we can improve risk factor identification. We need to go to a naval training center and look at the recruits' flexibility when they are stepping off the bus, if plantar fasciitis is a major problem. The boots or the other footwear could be the cause. By examining their Achilles tendons we can determine if the fit is too tight. If it is too tight, we can prescribe stretching, which can make a big difference. An area for future research is that of correlating muscular strength and endurance in a female (or in a male, for that matter) with the job that he or she does. In my opinion, the semiannual physical fitness test doesn't accurately measure this.

We also need proper clinical expertise in the area where injuries are presenting. We don't have to take the orthopedic surgeon out of the operating room and put him into the clinic, but someone who has extra training in musculoskeletal injury could be used at the training center to help train and oversee the general medical officers in musculoskeletal medicine.

More aggression should be used in our treatment of injuries. The way we treat elite athletes in 1996 is vastly different from the way we treat the military population in terms of rehabilitation. If we were more aggressive in treating injuries, we might be able to decrease attrition. More research should be done



on the diagnosis, treatment, and prevention of stress fractures. We have enough of them, and they give us significant problems in training.

There are also issues in terms of movement miles. Simply getting from point A to point B at a naval training center (or going from the chow hall to the obstacle course back to the classroom) a recruit can put in about 6 miles a day, just in incidental movement. We should determine if we can decrease this.

The types of calisthenics we are doing should be examined. The Army, I understand, is changing from the situps to the crunch, a major improvement. The Marine Corps believes that one has to break the plane of the knee with the elbow when doing a situp. That is injurious to the back and can have a negative long-term effect on the neck. Unfortunately, however, this is still the technique that Marines have to use to pass their physical fitness test.

Many places have no circuit training for strength, and strength should be a component of fitness training. The American College of Sports Medicine has recommended strength training as part of the weekly training schedule for about everyone. Circuit training and strength training should be available in every area where there is physical training.

Finally, there is the issue of overtraining. If one looks at every training facility, it seems to get a little tougher every other year, because that commanding officer wants to distinguish himself by making his mark at that training facility. The system used to evaluate the commanding officers rewards the addition of new training components. It is my opinion that if the commander would eliminate part of the program and reduce some of the overtraining errors, that would be a big improvement to the training program. That is a tough concept to sell, but in some cases would result in much less injury. Although the military should be commended for its excellent fitness program, our most common error is overtraining.

We need to involve the line in changing procedures to decrease some of the injury rates by improvement in training. There are very good fitness instructors and master fitness instructors in the military, but sometimes the programs for training recruits have simply been passed down for years from gunny sergeant to gunny sergeant (beginning probably with the Vietnam or Korean era). Often the problem is over strenuous or premature activity in training.

We recently responded to a request for help from people at the Marine Corps Recruit Depot in San Diego who were concerned about the high rate of injury there. We convened an expert panel including drill instructors, experts in sports medicine, orthopedic surgeons, physiologists, fitness trainers, and epidemiologists to approach the problem. We did a study of what was actually done during the training program. It took about 10 weeks to go through their training, following them around and collecting data, before we could make recommendations. One of the things that we found was that when the recruits stepped off the bus in San Diego, the officers started a running regimen. The recruits ran a significant amount in the beginning, and the mileage curve was exponential in those first 3 weeks. Therefore, one of our recommendations was to slow that ramp-up to maximal running. We also recommended that they decrease the amount of load bearing in those first few weeks.

The other recommendation we made was to increase individual runs and reduce formation runs. One would never want to eliminate formation runs completely because they are a group builder—an esprit de corps builder. However, in formation runs completely each person has to change his or her gait to keep up with the group. Whether a woman is bigger or smaller, taller or shorter, than the person she is running behind, her gait has to be adjusted to the person in front of her. What seems obvious to us is that stride length is not related to gender, but to height. Because most females are shorter than most males, their stride length is shorter. Constantly having to adjust gait and use an



unnatural stride length contributes to injury. Therefore, we recommended that training involve more individualized runs.

Drill instructors, contrary to popular belief, do not want to injure the trainee. They do want to exhaust them physically and mentally and then bring them back up as a Marine or a soldier. They do want to exhaust them, but they don't want to injure them. We worked to change the curriculum used by the drill instructors to help them accomplish this.

Alternative training or cross-training for aerobic activity is a good idea. Running is the number one form of aerobic activity in the military. As a result, throughout their career, a person is taught that running equals aerobic fitness equals military readiness.

We made recommendations to the Marine Corps Recruit Depot to modify the 1995 training program to include more crosstraining and strength activities. We compared the injuries in 1993 and those in 1995 with the new program and found that there was a significant decrease in overuse injuries and stress fractures. It was exhaustive work to change the program, not only for the medical and research people, but also for the line, but it made a difference. There is more research still to be done, but the investment is worth it if injury rates and attrition can be decreased.

In conclusion, cardiorespiratory fitness is the best predictor for musculoskeletal injury, with the least fit at highest risk. Fitness needs to be put into the perspective of the daily tasks that the active-duty member performs. That is, the physical fitness tests are not totally representative of the fitness components needed to perform on the job. Finally, we must educate the active-duty members to the detrimental effects and injury risks caused by preventable activities, such as smoking and excess alcohol consumption.

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# Author Index

## A

- Abrams D: *See* Emmons KM, Linnan L, Abrams D, Lovell HJ  
 ACOG Committee on Ethics: End-of-Life Decision Making: Understanding the Goals of Care, *Opinion*, 287  
 Amini SB, Catalano PM, Mann LI: Births to Unmarried Mothers: Trends and Obstetric Outcomes, 264

## B

- Bachmann GA: *Turning Point, Book Review*, 114  
 Badenhop NE: *See* Ilich JZ, Badenhop NE, Matkovic V  
 Baird P: The Recommendations of the Canadian Royal Commission on New Reproductive Technologies, *Conference*, 126  
 Baird PA: New Reproductive Technologies: The Canadian Perspective, 156  
 Bartman B: Women's Access to Appropriate Providers Within Managed Care Settings, *Conference*, 11  
 Bartman BA: Women's Access to Appropriate Providers Within Managed Care: Implications for the Quality of Primary Care, 45  
 Berman ML: *See* Runowicz CD, Berman ML  
 Bernstein AB: Women's Health in HMOs: What We Know and What We Need to Find Out, 51  
 Bondi RL: Outreach to Pregnant Women, *Conference*, 25  
 Breitbart V: *See* Chavkin W, Breitbart V  
 Brown D, Rigby F, Elkins T: HIV Infection and Physician Responsibilities: A Commentary on the ACOG Ethics Committee Opinion #130, *Commentary*, 106  
 Brown D: *See* Elkins TE, Brown D, Martey JO

## C

- Catalano PM: *See* Amini SB, Catalano PM, Mann LI  
 Chavkin W, Breitbart V: Reproductive Health and Blurred Professional Boundaries, 89  
 Chervenak FA, McCullough LB: Preventive Ethics and End-of-Life Decisions, *Commentary*, 304  
 Chescheir N: *See* Evins G, Chescheir N  
 Collins KS, Simon LJ: Women's Health and Managed Care: Promises and Challenges, 39

- Collins KS: Women's Experience in Managed Care System, *Conference*, 4  
 Croft JB: *See* Lane MJ, Macera CA, Croft JB, Meyer PA  
 Cruess DF: *See* Horton JA, Cruess DF, Romans MC  
 Curbow B: *See* Weisman CS, Curbow B, Khoury AJ

## D

- Davis BE: Personal Experience with Policy Around Family Issues, *Conference*, 366  
 Deuster PA: Exercise in the Prevention and Treatment of Chronic Disorders, *Conference*, 320  
 Poth M: Forum on the Health of Women in the Military: Executive Summary, *Conference*, 311  
 Dunn LJ: Current Issues and Controversies, *Conference*, 30

## E

- Elkins T: *See* Brown D, Rigby F, Elkins T  
 Elkins TE, Brown D, Martey JO: Funding Priorities for a Struggling World: Ours and Theirs, Letter, 115  
 Emmons KM, Linnan L, Abrams D, Lovell HJ: Women Who Work in Manufacturing Settings: Factors Influencing Their Participation in Worksite Health Promotion Programs, 74  
 Evins G, Chescheir N: Prevalence of Domestic Violence Among Women Seeking Abortion Services, 204

## F

- Farrell D: *See* Morton E, Tambor E, Rimer BK, Tessaro I, Farrell D, Siegler IC

## G

- Gates EA: Understanding the Goals of Care in End-of-Life Decision Making: A Committee Opinion at the Bedside, *Commentary*, 302  
 Gehlbach D: Contraceptive Needs, Complications and New Directions for Research, *Conference*, 355  
 Goldhill F: The United Kingdom's Experience with a Regulatory Body, *Conference*, 122  
 Grodin MA: Women's Health and End-of-Life Decision Making, *Commentary*, 295

## H

- Hawley-Bowland C: Epidemiologic Overview of Common Gynecological Disorders and First Trimester Complications Among Active Duty Women, *Conference*, 353

- Ho S: Managing Health Risks Within Managed Care Systems, *Conference*, 7

- Horton JA, Cruess DF, Romans MC: Compliance with Mammography Screening Guidelines: 1995 Mammography Attitudes and Usage Study Report, 239

## I

- Ilich JZ, Badenhop NE, Matkovic V: Primary Prevention of Osteoporosis: Pediatric Approach to Disease of the Elderly, 194

## J

- Jonsen AR, Macklin R, White GB: Executive Summary: Assisted Reproduction: A Process Ripe for Regulation? *Conference*, 117

## K

- Katz R: The Current State of Knowledge, *Conference*, 28  
 Khoury AJ: *See* Weisman CS, Curbow B, Khoury AJ  
 King N: Perspectives on Nutritional Issues of Military Women, *Conference*, 368

## L

- Landers DV: Vaginitis/Cervicitis: Diagnosis and Treatment Options in a Limited Resource Environment, *Conference*, 342  
 Lane MJ, Macera CA, Croft JB, Meyer PA: Preventive Health Practices and Perceived Health Status Among Women Over 50, 279  
 Lebow M: *Medical Malpractice and the American Jury: Confronting the Myths about Jury Incompetence, Deep Pockets, and Outrageous Damage Awards, Book Review*, 309  
 Linnan L: *See* Emmons KM, Linnan L, Abrams D, Lovell HJ  
 Lovell HJ: *See* Emmons KM, Linnan L, Abrams D, Lovell HJ  
 Lowey NM: Review of APGO Women's Health Curricula Proposal, *Editorial*, 192

## M

- Macera CA: *See* Lane MJ, Macera CA, Croft JB, Meyer PA  
 Macklin R: *See* Jonsen AR, Macklin R, White GB

- Magrane DM, McIntyre-Seltman K: Women's Health Care Issues for Medical Students: An Education Proposal, 183
- Mann LI: See Amini SB, Catalano PM, Mann LI
- Manore MM: Chronic Dieting in Active Women: What are the Health Consequences? *Conference*, 332
- Marks JS: See Wilcox LS, Marks JS
- Marriott B: Nutrition and Health in Military Women: A Lifelong Issue, *Conference*, 375
- Martey JO: See Elkins TE, Brown D, Martey JO
- Matkovic V: See Ilich JZ, Badenhop NE, Matkovic V
- Matuk LC: Pap Smear Screening Practices in Newcomer Women, 82
- McCullough LB: See Chervenak FA, McCullough LB
- McGivney WT: Coverage Decisions Regarding Experimental Treatments and Technologies, *Conference*, 17
- McIntyre-Seltman K: See Magrane DM, McIntyre-Seltman K
- Meyer PA: See Lane MJ, Macera CA, Croft JB, Meyer PA
- Montell F: See White F, Montell F
- Moore G: Reproductive Hazards: Military Policy Implications, *Conference*, 363
- Moore J: Exercise, Conditioning, and Fitness as It Relates to Injury in Active Duty Women, *Conference*, 374
- Moreno JD: See Schwarz RH, Moreno JD
- Morton E, Tambor E, Rimer BK, Tessaro I, Farrell D, Siegler HC: Impact of National Cancer Institute Revised Mammography Screening Guidelines on Women 40-49, 246
- P**
- Page CA: Results of a Controlled Trial to Increase Mammography Screening Rates, *Conference*, 20
- Parchment W, Weiss G, Passannante MR: Is the Lack of Health Insurance the Major Barrier to Early Prenatal Care at an Inner-City Hospital? 97
- Passannante MR: See Parchment W, Weiss G, Passannante MR
- Pearse WH: *Women's Health Issues* Now Offers Subscribers Six Issues per Year, *Editorial*, 64
- Peoples-Sheps MD: Prenatal Care: Will the Past Predict the Future? *Editorial*, 235
- Petit N: Dysfunctional Uterine Bleeding in Active Duty Women: Scope of the Problem and Management Options, *Conference*, 358
- Piles M: See Piombo M, Piles M
- Piombo M, Piles M: The Relationship Between College Females' Drinking and Their Sexual Behaviors, 221
- Pollock AE: Cooperation Yields Best Results For Improved REproductive Health Care, *Letter*, 307
- Pool TB: The Laboratory as a Partner in Assisted Reproduction, *Conference*, 134
- R**
- Randall VF: See Wahl CK, Randall VF
- Rigby F: See Brown D, Rigby F, Elkins T
- Rimer BK: See Morton E, Tambor E, Rimer BK, Tessaro I, Farrell D, Siegler IC
- Robertson JA: A View in Favor of Preserving Procreative Liberty, *Conference*, 140
- Romans M: See Vellozzi CJ, Romans M, Rothenberg RB
- Romans MC: See Horton JA, Cruess DF, Romans MC
- Rosa C: Impact of Pregnancy and Pregnancy Complications During Deployment: The Role of Pregnancy Screening, *Conference*, 361
- Rosenbaum S: Woman at Risk: Integrating Reproductive Health Services into Public Systems of Managed Care, *Conference*, 15
- Rothenberg RB: See Vellozzi CJ, Romans M, Rothenberg RB
- Runowicz CD, Berman ML: Access to Cancer Care and Clinical Trials: A Time for Reappraisal, *Editorial*, 112
- S**
- Schofield LJ: Models and Best Practices, *Conference*, 32
- Schwarz RH, Moreno JD: HIV Testing: The Evolution of a Policy, *Editorial*, 109
- Sharpe V: End-Of-Life Decision Making, 286
- Siegler IC: See Morton E, Tambor E, Rimer BK, Tessaro I, Farrell D, Siegler IC
- Simon LJ: See Collins KS, Simon LJ
- Steinbock B: A Call for Ethical Boundaries in Assisted Reproduction, *Conference*, 144
- Steinbock B: Regulating Assisted Reproductive Technologies: An Ethical Framework, 167
- T**
- Taggart MS: *Managed Care & You: The Consumer Guide to Managing Your Health Care*, *Book Review*, 308
- Tambor E: See Morton E, Tambor E, Rimer BK, Tessaro I, Farrell D, Siegler IC
- Tessaro I: See Morton E, Tambor E, Rimer BK, Tessaro I, Farrell D, Siegler IC
- V**
- Vellozzi CJ, Romans M, Rothenberg RB: Delivering Breast and Cervical Cancer Screening Services to Underserved Women: Part I. Literature Review and Telephone Survey, 65
- Vellozzi CJ, Romans M, Rothenberg RB: Delivering Breast and Cervical Cancer Screening Services to Underserved Women: Part II. Implications for Policy, 211
- W**
- Wahl CK, Randall VF: Military Women as Wives and Mothers, *Conference*, 315
- Wall LL: Obstetric Fistulas in Africa and the Developing World: New Efforts to Solve an Age-Old Problem, 229
- Warner CK: Identifying and Meeting the Needs of Women as a Population, *Conference*, 23
- Warner CK: Planning for Women's Health Care Services, 60
- Weisman CS: Introduction to Proceedings of *Women's Health and Managed Care: Balancing Cost, Access, and Quality*, *Conference*, 1
- Weisman CS, Curbow B, Khoury AJ: Women's Health Centers and Managed Care, 255
- Weiss G: See Parchment W, Weiss G, Passannante MR
- White F, Montell F: Identification and Treatment of Exercise Resistance: A Syndrome Associated with Eating Disorders, 273
- White GB: See Jonsen AR, Macklin R, White GB
- Wilcox L: Federal Oversight of Assisted Reproduction: Public Health, Consumer Protection, and Public Resources, *Conference*, 150
- Wilcox LS, Marks JS: Regulating Assisted Reproductive Technologies: Public Health, Consumer Protection, and Public Resources, 175
- Wolfe J: Post-Traumatic Stress Disorder in Women Veterans, *Conference*, 349
- Wright L: *A Guide to Effective Care in Pregnancy and Childbirth*, 2nd ed., *Book Review*, 114
- Y**
- Yi JK: Are Asian/Pacific Islander American Women Represented in Women's Health Research? *Letter*, 237
- Z**
- Zarutskie P: Collection of Clinical Data on Assisted Reproduction, *Conference*, 132

# Subject Index

## A

- Abortion services, women seeking, prevalence of domestic violence among, 204
- Access to Cancer Care and Clinical Trials: A Time for Reappraisal, *Editorial*, Runowicz CD, Berman ML, 112
- Access
  - cost, and quality, balancing: proceedings of *Women's Health and Managed Care, Conference*, 1
  - women's, to appropriate providers within managed care: implications for the quality of primary care, 45
- ACOG Ethics Committee Opinion #130: HIV Infection and Physician Responsibilities, *Commentary*, 106
- Africa
  - funding priorities for, *Letter*, 114
  - obstetric fistulas in, 229
- African American women, delivering breast and cervical cancer screening to, strategies aimed at, 68
- Age
  - impact of National Cancer Institute revised guidelines on women 40-49, 246
  - preventive health practices and perceived health status among women over 50, 279
- APGO, *See* Association of Professors of Gynecology and Obstetrics
- Are Asian/Pacific Islander American Women Represented in Women's Health Research? *Letter*, Yi JL, 235
- Asian/Pacific Islander American women, representation in women's health research, *Letter*, 235
- Assisted Reproduction: A Process Ripe for Regulation: A Conference of the National Advisory Board on Ethics in Reproduction, 117
- Session One: Selected International Perspectives on the Regulation of Assisted Reproduction
  - The Recommendations of the Canadian Royal Commission on New Reproductive Technologies, Baird P, 126
  - The United Kingdom's Experience with a Regulatory Body, Goldhill F, 122
- Session Two: Selected Clinical Perspectives in the United States 131
- Collection of Clinical Data on Assisted Reproduction, Zarutskie P, 132
- The Laboratory as a Partner in Assisted Reproduction, Pool TB, 134

- Session Three: Legal and Ethical Issues in Assisted Reproduction
  - A Call for Ethical Boundaries in Assisted Reproduction, Steinbock B, 144
  - A View in Favor of Preserving Procreative Liberty, Robertson JA, 140
- Session Four: U.S. Regulation Issues
  - Federal Oversight of Assisted Reproduction: Public Health, Consumer Protection, and Public Resources, Wilcox L, 150
- Assisted reproductive technologies
  - ethical framework, 167
  - regulating, public health, consumer protection, and public resources, 175
- Association of Professors of Gynecology and Obstetrics (APGO), review of Women's Health Curricula Proposal, *Editorial*, 192

## B

- Births to Unmarried Mothers: Trends and Obstetric Outcomes, Amini SB, Catalano PM, Mann LI, 264
- Book reviews
  - A Guide to Effective Care in Pregnancy and Childbirth* (Enkin M, Keirse MJ, Renfrew M, Nelson J), Wright L, 114
  - Managed Care & You: The Consumer Guide to Managing Your Health Care* (Cafferky ME), Taggart MS, 308
  - Medical Malpractice and the American Jury: Confronting the Myths About Jury Incompetence, Deep Pockets, and Outrageous Damage Awards* (Vidmar N), Lebow M, 309
  - Turning Point* (Furman CS), Bachman GA, 114
- Boundaries, professional, blurred, reproductive health and, 89
- Breast and cervical cancer screening services, delivering to underserved women
  - Part I. Literature review and telephone survey, 65
  - Part II. Implications for policy, 211

## C

- A Call for Ethical Boundaries in Assisted Reproduction, *Conference*, Steinbock B, 144
- Canadian experience: new reproductive technologies, 156
- Canadian Royal Commission on New Reproductive Technologies, recommendations of, *Conference*, 126

- Cancer care, access to, *Editorial*, 112
- Cancer screening, breast and cervical, delivering to underserved women
  - Part I. Literature review and telephone survey, 65
  - Part II. Implications for policy, 211
- Care, goals of, understanding of, end-of-life decision making
  - Commentary*, 302
  - Opinion*, 287
- Cervical and breast cancer screening services, delivering to underserved women
  - Part I. Literature review and telephone survey, 65
  - Part II. Implications for policy, 211
- Cervicitis/vaginitis, in military women, diagnosis and treatment options, limited resources and, *Conference*, 342
- Chronic Dieting in Active Women: What Are the Health Consequences?, *Conference*, Manore MM, 332
- Chronic disorders, exercise in prevention and treatment of, *Conference*, 320
- Clinical data on assisted reproduction, collection of, *Conference*, 132
- Clinical judgment, the issues of, 92
- Clinical trials, access to, *Editorial*, 112
- Collection of Clinical Data on Assisted Reproduction, *Conference*, Zarutskie P, 132
- College females, relationship between drinking and sexual behavior, 221
- Commentary on the ACOG Ethics Committee Opinion #130: HIV Infection and Physician Responsibilities, Brown D, Rigby F, Elkins T, 106
- The Commonwealth Fund Survey of Women's Health, 40
- Compliance with Mammography Screening Guidelines: 1995 Mammography Attitudes and Usage Study Report, Horton JA, Cruess DF, Romans MC, 239
- Conditioning, exercise and fitness as it relates to injury in active duty women, *Conference*, 374
- Confidentiality, issue of, 91
- Consent, issues of, 91
- Consumer protection
  - federal oversight of assisted reproduction, *Conference*, 150
  - regulating assisted reproductive technologies, 175
- Contraceptive Needs, Complications and New Directions for Research, *Conference*, Gelbach D, 355

Controlled trial to increase mammography screening rates, results of, *Conference*, 20

Cooperation Yields Best Results for Improved Reproductive Health Care, *Letter*, Pollack AE, 307

Cost, access, and quality, balancing: proceedings of *Women's Health and Managed Care, Conference*, 1

Cost sharing, HMOs, 53

Coverage Decisions Regarding Experimental Treatments and Technologies, *Conference*, McGivney WT, 17

## D

Decision making, end-of life, *See* End-of-Life Decision Making

Delivering Breast and Cervical Cancer Screening Services to Underserved Women: Part I: Literature Review and Telephone Survey, Vellozzi CJ, Romans M, Rothenberg RB, 65

Delivering Breast and Cervical Cancer Screening Services to Underserved Women: Part II: Implications for Policy, Vellozzi CJ, Romans M, Rothenberg RB, 211

Deployment, pregnancy and pregnancy complications during, impact of pregnancy screening, *Conference*, 361

Developing world, obstetric fistulas in, 229

Dieting, chronic, in active women, health consequences, *Conference*, 332

Domestic violence, prevalence among women seeking abortion services, 204

Drinking, college females, relationship to sexual behavior, 221

Dysfunctional Uterine Bleeding in Active Duty Women: Scope of the Problem and Management Options, *Conference*, Petit N 358

## E

Eating disorders, exercise resistance associated with, 273

Editorials

Access to Cancer Care and Clinical Trials: A Time for Reappraisal, Runowicz CD, Berman ML, 112

HIV Testing: The Evolution of a Policy, Schwartz RH, Moreno JD, 109

Prenatal Care: Will the Past Predict the Future? Peoples-Sheps MD, 235

Review of APOG Women's Health Curricula Proposal, Lowey NM, 192

*Women's Health Issues* Now Offers Subscribers Six Issues per Year, Pearse WH, 64

Education proposal, women's health care issues for medical students, 183

Elderly

delivering breast and cervical cancer screening to, strategies aimed at, 70

osteoporosis in, primary prevention of, pediatric approach to, 194

End-of-Life Decision Making, Sharpe V, 286

End-of-Life Decision Making: Understanding the Goals of Care, *Opinion*, ACOG Committee on Ethics, 287

End-of-life decision making, women's health and, *Commentary*, 295

End-of-life decisions, preventive ethics and, *Commentary*, 304

Epidemiologic Overview on Common Gynecologic Disorders and First Trimester Complications Among Active Duty Women, *Conference*, Hawley-Bowland C 353

## Ethics

in assisted reproduction, *Conference*, 140, 144

preventive, end-of life decisions and, *Commentary*, 304

regulating assisted reproductive technologies, 167

Exercise, Conditioning, and Fitness As It Relates to Injury in Active Duty Women, *Conference*, Moore J, 374

Exercise in the Prevention and Treatment of Chronic Disorders, *Conference*, Deuster PA, 320

Exercise resistance, identification and treatment of, association with eating disorders, 273

Experimental treatments and technologies, coverage decisions regarding *Conference*, 17

## F

Family matters, military policy around, *Conference*, 366

Federal Oversight of Assisted Reproduction: Public Health, Consumer Protection, and Public Resources, *Conference* 150

First trimester complications, among active duty women, *Conference*, 353

Fistulas, obstetric, in Africa and the developing world, 229

Fitness, exercise, and conditioning as it relates to injury in active duty women, *Conference*, 374

*Forum on the Health of Women in the Military*

Chronic Dieting in Active Women: What Are the Health Consequences? Manore MM, 332

Conference participants

Contraceptive Needs, Complications and New Directions for Research, Gelbach D, 355

Dysfunctional Uterine Bleeding in Active Duty Women: Scope of the Problem and Management Options, Petit N, 358

Epidemiologic Overview on Common Gynecological Disorders and First Trimester Complications Among Active Duty Women, Hawley-Bowland C, 353

Executive Summary, Poth M, 311

Exercise, Conditioning and Fitness As It Relates to Injury in Active Duty Women, Moore J, 374

Exercise in the Prevention and Treatment of Chronic Disorders, Deuster PA, 320

Military Women as Wives and Mothers, Kralovansky C, Randall VF, 315

Nutrition and Health in Military Women: A Lifelong Issue, Marriott B, 371

Personal Experience with Policy Around Family Matters, Davis BE, 366

Perspectives on Nutritional Issues Of Military Women, King N, 368

Post-Traumatic Stress Disorder in Women Veterans, Wolfe J, 349

Reproductive Hazards: Military Policy Implications, Moore G, 363

Vaginitis/Cervicitis: Diagnosis and Treatment Options in a Limited Resource Environment, Landers DV, 342

Funding Priorities for a Struggling World: Ours and Theirs, *Letter*, Elkins TE, Brown D, Martley JO, 114

## G

Gynecologic disorders, among active duty women, *Conference*, 353

## H

Health, women's, and end-of-life decision making, *Commentary*, 295

Health care services, women's planning for, 60

Health centers, women's, managed care and, 255

Health in military women, *See Forum on the Health of Women in the Military*

Health insurance, *See* Insurance

Health promotion programs, worksite, factors influencing their participation in: women who work in manufacturing settings, 74

Health risks, managing within managed care systems, *Conference*, 7

Health services, reproductive, integrating into public systems of managed care: women at risk, *Conference*, 15

Health status, perceived, among women over 50, 279

HIV Infection and Physician Responsibilities: A Commentary on the ACOG Ethics Committee Opinion #130, *Commentary*, Brown D, Rigby F, Elkins T, 106

HIV Testing: The Evolution of a Policy, *Editorial*, Schwartz RH, Moreno JD, 109

HMOs, women's health in: what we know and what we need to find out, Bernstein AB, 51



Hospital, inner-city hospital, early prenatal care at, lack of health insurance as the major barrier to, 97

## I

Identification and Treatment of Exercise Resistance: A Syndrome Associated with Eating Disorders, White F, Montell F, 273

Identifying and Meeting the Needs of Women as a Population, *Conference*, Warner CK, 23

Impact of National Cancer Institute Revised Mammography Screening Guidelines on Women 40-49, Morton E, Tambor E, Rimer BK, Tessaro I, Farrell D, Siegler IC, 246

Impact of Pregnancy and Pregnancy Complications During Deployment: The Role of Pregnancy Screening, *Conference*, Rosa C, 361

Injury in active duty women, fitness, exercise and conditioning as it relates to injury, *Conference*, 374

Inner-city hospital, early prenatal care at, lack of health insurance as the major barrier to, 97

Insurance, health

HMOs, benefits, 51

lack of, as the major barrier to early prenatal care at an inner-city hospital, 97

Is the Lack of Health Insurance the Major Barrier to Early Prenatal Care at an Inner-City Hospital? Parchment W, Weiss G, Passannante MR, 97

## L

The Laboratory as a Partner in Assisted Reproduction, *Conference*, 134

Legal and Ethical Issues in Assisted Reproduction, *Conference*, 140

## M

Mammography screening

guidelines, compliance with: 1995

Mammography Attitudes and Usage Study Report, 239

impact of National Cancer Institute revised guidelines on women 40-49, 246

rates, results of a controlled trial to increase, *Conference*, 20

Managed care

appropriate providers within, women's access to: implications for the quality of primary care, 45

managing health risks within, *Conference*, 7

public systems of, integrating reproductive health services into: women at risk, *Conference*, 15

women's experience in, *Conference*, 4

women's health and

proceedings of: *Balancing Cost, Access, and Quality*, *Conference*, 1

promises and challenges, 39

women's health centers and, 255

Managed care settings, women's access to appropriate providers within, *Conference*, 11

Managing Health Risks Within Managed Care Systems, *Conference*, 7

Manufacturing settings, women who work in: factors influencing their participation in worksite health promotion programs, 74

Medicaid, Managed Care, and Women's Health, 42

Medical students, women's health care issues for, 183

Military Women as Wives and Mothers, *Conference*, Wahl CK, Randall VF, 315

Military, women in, *See Forum on the Health of Women in the Military*

Mothers

military women as, *Conference*, 315

unmarried, births to, trends and obstetric outcomes, 264

## N

National Advisory Board on Ethics in Reproduction, a conference of: Assisted Reproduction, 117

National Cancer Institute Revised Mammography Screening Guidelines on Women 40-49, impact of, 246

New Reproductive Technologies: The Canadian Perspective, Baird PA, 156

Newcomer women, Pap smear screening practices in, 82

Nutrition and Health in Military Women: A Lifelong Issue, *Conference*, Marriott B, 371

Nutritional issues of military women, *Conference*, 368

## O

Obstetric Fistulas in Africa and the Developing World: New Efforts to Solve an Age-Old Problem, Wall LL, 229

Obstetric outcomes, births to unmarried mothers, 264

Osteoporosis, primary prevention of, pediatric approach to, 194

Outreach to Pregnant Women, *Conference*, Bondi RL, 25

## P

Pacific Islander/Asian American women, representation in women's health research, *Letter*, 235

Pap Smear Screening Practices in Newcomer Women, Matuk LC, 82

Pediatrics, approach to primary prevention of osteoporosis in the elderly, 194

Personal Experience with Policy Around Family Matters, *Conference*, Davis BE, 366

Perspectives on Nutritional Issues of Military Women, *Conference*, King N, 368

Physician responsibilities, HIV infection and, *Commentary*, 106

Physicians' practices, characteristics of, 47

The Physician-Patient Relationship: The Issues of Consent, 91

Planning for Women's Health Care Services, Warner CK, 60

Policy, implications for, delivering breast and cervical cancer screening to underserved women, 211

Population, women as, the needs of, identifying and meeting, *Conference*, 23

Post-Traumatic Stress Disorder in Women Veterans, *Conference*, Wolfe J, 349

Pregnancy

first trimester complications, among

active duty women, *Conference*, 353

and pregnancy complications during deployment, impact of, role of pregnancy screening, *Conference*, 361

Pregnant women, outreach to, *Conference*, 25

Prenatal Care: Will the Past Predict the Future?, *Editorial* Peoples-Sheps MD, 235

Prenatal care, early, at an inner-city hospital, lack of health insurance as the major barrier to, 97

Prevalence of Domestic Violence Among Women Seeking Abortion Services, Evins G, Chescheir N, 204

Preventive Ethics and End-Of-Life Decisions, *Commentary*, Chervenak FA, McCullough LB, 304

Preventive Health Practices and Perceived Health Status Among Women Over 50, Lane MJ, Macera CA, Croft JB, Meyer PA, 279

Primary care, quality of, implications for: women's access to appropriate providers within managed care, 45

Primary Prevention of Osteoporosis: Pediatric Approach to Disease of the Elderly, Ilich JZ, Badenhop NE, Matkovic V, 194

Proceedings of Women's Health and Managed Care: *Balancing Cost, Access, and Quality*, *Conference*, Weisman CS, 1

Professional boundaries, blurred, reproductive health and, 89

Promises and Challenges for Women's Health, 43

Providers

appropriate, women's access to, within managed care settings

*Conference*, 11

implications for the quality of primary care, 45

HMOs, 56

women's preference for, 48

Public health

federal oversight of assisted reproduction, *Conference*, 150

regulating assisted reproductive technologies, 175

Public systems of managed care, integrating reproductive health services into: women at risk, *Conference*, 15

## Q

### Quality

cost, access and, balancing: proceedings of *Women's Health and Managed Care, Conference*, 1

of primary care, implications for: women's access to appropriate providers within managed care, 45

## R

The Recommendations of the Canadian Royal Commission on New Reproductive Technologies, *Conference*, Baird P, 126

Regulating Assisted Reproductive Technologies: An Ethical Framework, Steinbock, 167

Regulating Assisted Reproductive Technologies: Public Health, Consumer Protection, and Public Resources, Wilcox LS, Marks JS, 175

Regulation, a process ripe for, assisted reproduction, *Conference*, 117

The Relationship Between College Females' Drinking and Their Sexual Behaviors, Piomba M, Piles M, 221

Reproductive Hazards: Military Policy Implications, *Conference*, Moore G, 363

Reproductive Health and Blurred Professional Boundaries, Chavkin W, Breitbart V, 89

Reproductive health care, improved, cooperation results in, *Letter*, 307

Reproductive health services, integrating into public systems of managed care: women at risk, *Conference*, 15

Reproductive technologies, new: The Canadian Perspective, 156

### Research

contraceptive needs, complications and, *Conference*, 355

women's health, Asian/Pacific Islander American women representation in, *Letter*, 235

### Resources, public

federal oversight of assisted reproduction, *Conference*, 150

regulating assisted reproductive technologies, 175

Results of a Controlled Trial to Increase Mammography Screening Rates, *Conference*, Page CA, 20

Review of APGO Women's Health Curricula Proposal, *Editorial*, Lowey NM, 192

Risk, women at: integrating reproductive health services into public systems of managed care, *Conference*, 15

## S

Screening, *See* Cancer screening; Mammography screening

Sexual behavior, college females, relationship to drinking, 221

Sexually transmitted diseases, *See also* HIV vaginitis/cervicitis, in military women, diagnosis and treatment options, limited resources and, *Conference*, 342

Survey of women's health, Commonwealth Fund, 40

## U

Underserved women, delivering breast and cervical cancer screening services to

Part I: literature review and telephone survey, 65

Part II: Implications for policy, 211

Understanding the Goals of Care in End-Of-Life Decision Making: A Committee Opinion at the Bedside, *Commentary*, Gates EA, 302

The United Kingdom's Experience with a Regulatory Body, *Conference*, Goldhill F, 122

### United States

regulatory issues in assisted reproduction, *Conference*, 150

selected clinical perspectives on regulation in assisted reproduction, *Conference*, 131

Unmarried mothers, births to, trends and obstetric outcomes, 264

Uterine bleeding, *See* Dysfunctional uterine bleeding

## V

Vaginitis/Cervicitis: Diagnosis and Treatment Options in a Limited Resource Environment, *Conference*, Landers DV, 342

A View in Favor of Preserving Procreative Liberty, *Conference*, Robertson JA, 140

Violence, domestic, prevalence among women seeking abortion services, 204

## W

Wives, military women as, *Conference*, 315

Women, as a population, the needs of, identifying and meeting, *Conference*, 23

Women at Risk: Integrating Reproductive Health Services into Public Systems of Managed Care, *Conference*, Rosenbaum S, 15

Women Who Work in Manufacturing Settings: Factors Influencing Their Participation in Worksite Health Promotion Programs, Emmons KM, Linnan L, Abrams D, Lovell HJ, 74

Women's Access to Appropriate Providers Within Managed Care: Implications for the Quality of Primary Care, Bartman BA, 45

Women's Access to Appropriate Providers Within Managed Care Settings, *Conference*, Bartman B, 11

Women's Experiences in Managed Care Systems, *Conference*, Collins KS, 4

Women's Health and End-of-life Decision Making, *Commentary*, Grodin MA, 295

### Women's Health and Managed Care:

*Balancing Cost, Access, and Quality*, Proceedings of, *Conference*, 1

Introduction to the Proceedings, Weisman CS, 1

Panel I: Current State of Knowledge Managing Health Risks Within Managed Care, Ho S, 7

Women's Experience in Managed Care Systems, Collins KS, 4

Panel II: Current and Controversial Issues

Coverage Decisions Regarding Experimental Treatments and Technologies, McGivney WT, 17

Women at Risk: Integrating Reproductive Health Services Into Public Systems of Managed Care, Rosenbaum S, 15

Women's Access to Appropriate Providers Within Managed Care, Bartman B, 11

Panel III: Models and Best Practices Identifying and Meeting the Needs of Women as a Population, Warner CK, 23

Outreach to Pregnant Women, 25

Results of a Controlled Trial to Increase Mammography Screening Rates, Page CA, 20

Panel IV: Summary and Directions for the Future

Summary of Panel I: The Current State of Knowledge, Katz R, 28

Summary of Panel II: Current Issues and Controversies, Dunn LJ, 30

Summary of Panel III: Models and Best Practices, Schofiels LJ, 32

Women's Health and Managed Care: Promises and Challenges, Collins KS, Simon LJ, 39

Women's Health Care Issues for Medical Students: An Education Proposal, Magrane DM, McIntyre-Seltman K, 183

Women's Health Centers and Managed Care 255

Women's Health Curricula Proposal, APGO, review of, *Editorial*, 192

Women's Health in HMOs: What We Know and What We Need to Find Out, Bernstein AB, 51

*Women's Health Issues* Now Offers Subscribers Six Issues per Year, *Editorial*, Pearse WH, 64

Worksite health promotion programs, factors influencing their participation in: women who work in manufacturing settings, 74

# WOMEN'S HEALTH ISSUES

Official Publication of The Jacobs Institute of Women's Health

## Contents of Volume 6

Volume 6, Number 1

January/February 1996

### *Conference*

**Proceedings of Women's Health and Managed Care: Balancing Cost,  
Access, and Quality 1**



**Conference Participants 37**



### *Article*

**Women's Health and Managed Care: Promises and Challenges 39**

Karen Scott Collins, Lois J. Simon



### *Article*

**Women's Access to Appropriate Providers Within Managed Care:  
Implications for the Quality of Primary Care 45**

Barbara A. Bartman



### *Article*

**Women's Health in HMOs:  
What We Know and What We Need to Find Out 51**

Amy B. Bernstein



### *Article*

**Planning for Women's Health Care Services 60**

Cheryl K. Warner



### *Editorial*

**Women's Health Issues Now Offers Subscribers  
Six Issues per Year 64**

Warren H. Pearse

*Article*

**Delivering Breast and Cervical Cancer Screening Services to  
Underserved Women: Part I. Literature Review and  
Telephone Survey 65**

Claudia J. Vellozzi, Martha Romans, Richard B. Rothenberg



*Article*

**Women Who Work in Manufacturing Settings: Factors Influencing  
Their Participation in Worksite Health Promotion Programs 74**

Karen M. Emmons, Laura Linnan, David Abrams, H. Joan Lovell



*Article*

**Pap Smear Screening Practices in Newcomer Women 82**

Lucia C. Matuk



*Article*

**Reproductive Health and Blurred Professional Boundaries 89**

Wendy Chavkin, Vicki Breitbart



*Article*

**Is the Lack of Health Insurance the Major Barrier to Early Prenatal  
Care at an Inner-City Hospital? 97**

Winsome Parchment, Gerson Weiss, Marian R. Passannante



*Commentary*

**HIV Infection and Physician Responsibilities: A Commentary on  
the ACOG Ethics Committee Opinion #130 106**

Douglas Brown, Fidelma Rigby, Thomas Elkins



*Editorial*

**HIV Testing: The Evolution of a Policy 109**

Richard H. Schwarz, Jonathan D. Moreno



*Editorial*

**Access to Cancer Care and Clinical Trials:  
A Time for Reappraisal 112**

Carolyn D. Runowicz, Michael L. Berman



*Book Reviews*

**Turning Point 114**

Gloria A. Bachmann

**A Guide to Effective Care in Pregnancy and Childbirth 114**

Lydia Wright



*Letter*

**Funding Priorities for a Struggling World: Ours and Theirs 115**

Thomas E. Elkins, Douglas Brown, J. O. Martey

Volume 6, Number 3

May/June 1996

*Conference*

***Assisted Reproduction: A Process Ripe for Regulation?***

**Executive Summary 117**

Albert R. Jonsen, Ruth Macklin, Gladys B. White

**Session One: Selected International Perspectives on the Regulation  
of Assisted Reproduction 122**

**Session Two: Selected Clinical Perspectives  
in the United States 131**

**Session Three: Legal and Ethical Issues  
in Assisted Reproduction 140**

**Session Four: U.S. Regulatory Issues 150**



*Article*

**New Reproductive Technologies: The Canadian Perspective 156**

Patricia A. Baird



*Article*

**Regulating Assisted Reproductive Technologies:  
An Ethical Framework 167**

Bonnie Steinbock



*Article*

**Regulating Assisted Reproductive Technologies:  
Public Health, Consumer Protection, and Public Resources 175**

Lynne S. Wilcox, James S. Marks



**Conference Participants 181**

*Article*

**Women's Health Care Issues for Medical Students:  
An Education Proposal 183**

Diane M. Magrane, Kathleen McIntyre-Seltman

■

*Editorial*

**Review of APGO Women's Health Curricula Proposal 192**

Nita M. Lowey

■

*Article*

**Primary Prevention of Osteoporosis:  
Pediatric Approach to Disease of the Elderly 194**

Jasminka Z. Ilich, Nancy E. Badenhop, Velimir Matkovic

■

*Article*

**Prevalence of Domestic Violence Among Women Seeking  
Abortion Services 204**

Gigi Evins, Nancy Chescheir

■

*Article*

**Delivering Breast and Cervical Cancer Screening Services to  
Underserved Women: Part II. Implications for Policy 211**

Claudia J. Vellozzi, Martha Romans, Richard B. Rothenberg

■

*Article*

**The Relationship Between College Females' Drinking  
and Their Sexual Behaviors 221**

Maria Piombo, Melinda Piles

■

*Article*

**Obstetric Fistulas in Africa and the Developing World:  
New Efforts to Solve an Age-Old Problem 229**

L. Lewis Wall

■

*Editorial*

**Prenatal Care: Will the Past Predict the Future? 235**

Mary D. Peoples-Sheps

■

*Letter*

**Are Asian/Pacific Islander American Women Represented in  
Women's Health Research? 237**

Jenny Kisuk Yi

*Article*

**Compliance with Mammography Screening Guidelines:  
1995 Mammography Attitudes and Usage Study Report 239**

Jacqueline A. Horton, David F. Cruess, Martha C. Romans

*Article*

**Impact of the National Cancer Institute Revised Mammography  
Screening Guidelines on Women 40-49 246**

Emma Morton, Ellen Tambor, Barbara K. Rimer, Irene Tessaro, David Farrell, Ilene C. Siegler

*Article*

**Women's Health Centers and Managed Care 255**

Carol S. Weisman, Barbara Curbow, Amal J. Khoury

*Article*

**Births to Unmarried Mothers: Trends and Obstetric Outcomes 264**

Saeid B. Amini, Patrick M. Catalano, Leon I. Mann

*Article*

**Identification and Treatment of Exercise Resistance:  
A Syndrome Associated with Eating Disorders 273**

Francie White, Frances Montell

*Article*

**Preventive Health Practices and Perceived Health Status  
Among Women Over 50 279**

Marcia J. Lane, Caroline A. Macera, Janet B. Croft, Pamela A. Meyer

*Introduction*

**End-of-Life Decision Making 286**

Virginia Sharpe

*Opinion*

**End-of-Life Decision Making: Understanding the Goals of Care 287**

ACOG Committee on Ethics

*Commentaries*

**Women's Health and End-of-Life Decision Making 295**

Michael A. Grodin

**Understanding the Goals of Care in End-of-Life Decision Making:  
A Committee Opinion at the Bedside 302**

Elena A. Gates

**Preventive Ethics and End-of-Life Decisions 304**

Frank A. Chervenak, Laurence B. McCullough





*Letter*

**Cooperation Yields Best Results for Improved  
Reproductive Health Care 307**

Amy E. Pollack



*Book Reviews*

**Managed Care & You:  
The Consumer Guide to Managing Your Health Care 308**

Martha Snyder Taggart

**Medical Malpractice and the American Jury:  
Confronting the Myths about Jury Incompetence, Deep Pockets,  
and Outrageous Damage Awards 309**

Morton Lebow

Volume 6, Number 6

November/December 1996

*Conference*

**Forum on the Health of Women in the Military:  
Executive Summary 311**

Merrily Poth



*Article*

**Military Women as Wives and Mothers 315**

Christine Kralovansky Wahl, Virginia F. Randall



*Article*

**Exercise in the Prevention and Treatment of Chronic Disorders 320**

Patricia A. Deuster



*Article*

**Chronic Dieting in Active Women: What Are the  
Health Consequences? 332**

Melinda M. Manore



*Article*

**Vaginitis/Cervicitis: Diagnosis and Treatment Options in a Limited  
Resource Environment 342**

Daniel V. Landers



*Conference*

**Selected Talks From the *Forum on the Health of Women in  
the Military* 349**



**Conference Participants 381**

**Author Index 383**

**Subject Index 385**

*Contents of Volume 6 Follow Subject Index*

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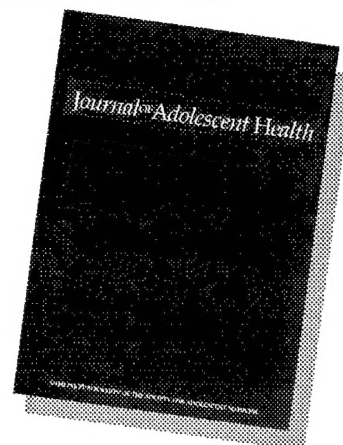
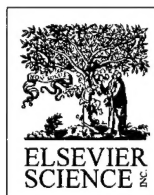
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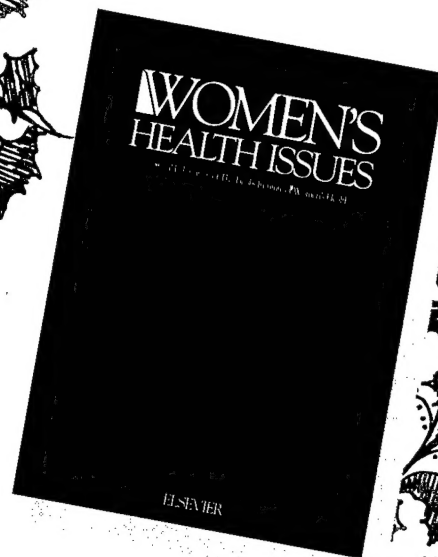
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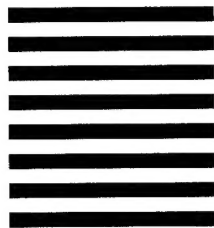
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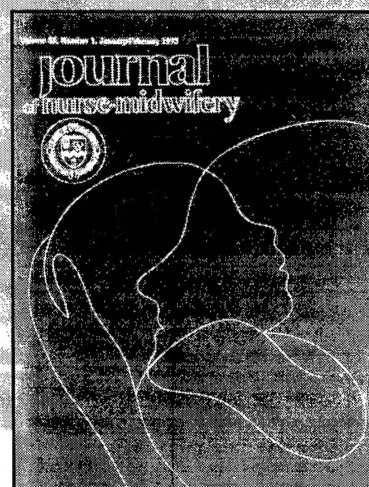
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